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CURAÇAO, A LOSING COLONIAL VENTURE.

BY

HERDMAN F. CLELAND,

Professor of Geology at Williams College, Williamstown, Mass.

If one were asked to describe the population, customs, architecture and commerce of a small hypothetical island, situated in the tropics, with a minimum temperature of 69° F. and a maximum temperature of 90°, with a semi-arid climate, the rainfall of which was about that of western Kansas or Nebraska, and lying within 41 miles of a mainland where Spanish customs and architecture prevailed, his descriptions would probably differ in a great many particulars from that which is to be found in the island of Curaçao.

This unusual condition is due to a combination of circumstances which are gradually passing away and which will, in time, result in a change to normal conditions. Before discussing the causes which produced this unusual state of affairs it may be well, briefly, to familiarize ourselves with the important points of the geology, history and population of the island.

The island is a Dutch colony and has belonged to that country, with the exception of a brief occupancy by Great Britain and France, since 1634. The influence of the mother country, as is usual in almost all colonies, is everywhere apparent. The houses are not such as one would expect to find in a tropical country but Dutch houses, with windows and red tiled roofs and without patios (interior courts). The streets are well paved and—most strange of all in a tropical climate—clean.

The island of Curaçao, or "Curaso" as the natives pronounce it, is relatively long for the width, being about 36 miles in length and

6 in width. The south shore is indented with a number of bays, the most important of which is that where the capital, Willemstad, and only town of any importance on the island, is situated. This harbour is a remarkable one and has played an important part in the history of the island. The entrance is not more than, perhaps, 400 yards wide but has a natural depth of 80 feet. This widens (see map) into a large bay where the depth is 40 to 60 feet and which is said to be large and deep enough to shelter the largest navy in the world.

When Admiral Cervera, of the Spanish fleet, crossed the Atlantic to prevent, if possible, the loss of Cuba, he put into this harbour for



REDUCED FROM THE GOVERNMENT SURVEY.

provisions and repairs, and so perfectly was he hid in that magnificent shelter that his whereabouts was a mystery to the American navy until his departure.

Since the only published accounts of the geology and physiography consulted are very meagre, it seems desirable that a general statement of its geologic history be made.

The island is, for the most part, of volcanic origin.\* The exact nature of the rocks of the interior could not be determined in a short

\*"Geological Map of North America," by Bailey Willis.

time, because of the great depth of the weathering, with the exception of the basaltic (?) dikes of more compact lava which stand up as low, rounded hills in various parts of the interior. The central mass, which is nowhere more than 1,200 feet above sea-level, is surrounded by a rim of limestone which forms cliffs with the escarpment on the landward side. This feature is at first puzzling, since limestone is soluble and softer than the rock of the interior, but its greater resistance to weathering appears to be due to its porosity. The water falling on it seeps through the pores and crevices of the rock and thence finds its way to the sea without eroding the surface to any great extent. The scanty vegetation on the limestone furnishes little carbon dioxide, so that the solvent power of the water is slight. A cave of considerable size, called the Cave of Hato, near the west end of the island, is in this limestone and is well worth a visit. It is an ordinary cave of solution with



A CROSS SECTION FROM WILLEMSTAD TO THE CAVE OF HATÓ.

stalactites, stalagmites and pillars of large size. A small spring, one of the two on the island, is here. A barrier reef lies a short distance from the coast at Willemstad, which is separated from the mainland by a shallow lagoon

A diagrammatic cross-section of the island from Willemstad to the east end is given here. In this diagram no attempt has been made to draw to scale, the purpose being merely to bring out the more important features.

On the east bank of the harbour, back of Willemstad, the limestone is underlaid by a stratum that is seen to be made up in part of water-worn volcanic material and indicates that the nucleus of the island was volcanic from which sediment was carried down to the sea. Subsidence followed or accompanied the deposition of these sediments, and, as the land became lower, and the erosive power diminished—or as the more easily eroded material became exhausted—the water, being less muddy, permitted the growth of corals, which formed a coral reef of considerable thickness. This subsidence was followed in turn by an elevation to a height of 100 feet or more above

the present position of the land. A period of quiet succeeded during which the streams eroded deep channels. The drowning of these valleys after the subsidence to the present position produced the magnificent harbour at Willemstad and the other harbours of the island. The smoother shore on the north is probably due either to the constant beating of the Northeast Trades or to a greater tilting to the south.

It is said that when the island was first visited by the Dutch at the beginning of the Seventeenth Century it had a population of only 500 persons, of which 30 were Spaniards. When one considers the natural physical conditions, this seems probable. The rainfall averages about 16 inches, although, it is said that for a period of 4 years almost no rain fell.\*

With such a small precipitation in a region where the minimum temperature is 69° and the maximum 90° F., little vegetation can thrive except in the valleys where the water, seeping through the ground, is held by the soil. The Dutch government has been experimenting to determine whether or not a greater part of the rainfall can be made available for crops. The most successful attempt thus far has resulted from the building of dams to prevent the water from running off. The water held back in this way does not long remain as a pond but soon soaks into the ground, and, as underground water, is drawn upon by the plants.

The so-called "water plantations" are situated in the valleys surrounding the harbour. Being in the valleys where the underground water is nearest the surface and most abundant the wells supply a considerable quantity of water, which is usually sold for 60 cents per ton during normal years, although it is stated that during one period of drought the price rose to \$6 per ton. Rain water sells for \$1.80 per ton, and water is also imported from the mainland. It is expected that in 1909 sea water will be distilled and sold at about \$1.80 per ton.

Curaçao is healthful, though hot and dry. Because of the lack of rain, and, consequently, of fresh water swamps, yellow fever and malaria are almost unknown except when brought from the mainland. Leprosy is a common disease among the negroes but is rare among the whites.

\* The rainfall between the years 1899 and 1904 was:

1899.....	16.17 inches.
1900.....	16.00 "
1901.....	16.00 "
1902.....	25.00 "
1903.....	14.75 "
1904.....	16.50 "



The cereals and vegetables grown on the island are of inferior quality and size. Corn is grown, which, with beans, constitutes the principal food of the natives. Bananas and other tropical fruits are raised but are not of a high quality or great quantity. Peanuts are also grown. The government has recently been experimenting with sisal, a plant similar to our century plant, the fiber of which makes a superior quality of hemp. The experiments appear to have been successful and it is possible that this will soon be one of the articles of export.

The principal articles of export are: Salt, which is obtained by evaporation from sea water: Phosphate, which has been mined extensively, and, in the past, yielded a large revenue to the government.



THE HARBOUR ENTRANCE AT WILLEMSTAD, LOOKING TOWARDS THE OCEAN.

At the present time, either because of the exhaustion of the deposits, or, as is reported, because of some disagreement on the part of the owners, little is now exported. The famous Curaçao liqueur was formerly manufactured and exported in considerable quantity. In fact, the island is better known to the outside world because of the popularity of this liqueur than for any other reason. It was made from the peel of a bitter orange that grew on the island, "distilled with sweet spirits and spices." On account of a protracted drought some years ago the orange trees died and the industry has never since regained its former importance. At present one or two druggists distil a small quantity of the liqueur, but the great majority of that sold on the market as "Curaçao liqueur" is manufactured in Holland. The total exports of the island in 1904 were only \$140,000.

The city of Willemstad (13,836 inhabitants) looks as little like a tropical city as one can well imagine; the architecture of the houses is Dutch, the streets are Dutch and scrupulously clean, the shops are Dutch, and the governing class is Dutch. But there the similarity ends; the negro population, the customs of the natives, the climate, the vegetation, almost everything else, except the cleanliness, is what one should not be surprised to find on a prosperous tropical island. When, however, the size and aridity of the island are considered, the population and commerce are out of relation to the physical conditions. The houses are all painted or whitewashed with some pale colour—never white—the most popular being yellow, rose and buff. On account of the reflection of the light from white walls a law was passed some time ago prohibiting the use of white paint, and, at the same time, making it obligatory on the owners to paint or whitewash their houses frequently; consequently, the place looks very prim and neat. Since the houses are all of stone (and the floors of the poorer houses earth), and since no fires are needed except for cooking, a fire department is unnecessary. The city is beautifully situated on the two sides of the entrance to the harbour, the two parts being connected by a pontoon bridge. Several of the business houses are large and contain complete and well-selected stocks of merchandise. The best customers of the merchants are Venezuelans who come to this free port to trade and take their chances on being able to smuggle their purchases through the Venezuelan custom houses. As a whole, the city impresses one as a thrifty, Dutch town of the temperate regions and well illustrates the effect of a mother country on a colony, even the language and population of which are totally different from that country.

The population of the island in 1907 was 30,401, of which about 28,000 were blacks and mulattoes and the remainder whites. Of the whites 625 are Jews. The Jews first came to the island from Portugal and Brazil between 1650 and 1654, as a result of their expulsion from those countries. Their descendants are the most prosperous and influential element of the native population. The negroes are practically all Catholics, a rather singular fact, since Holland is a Protestant country. But Holland has always been liberal in religious matters and even now pays a portion of the salaries of the clergy of all denominations, Hebrew, Protestant and Catholic.

Although the negroes are religious, if attendance at religious services is taken as a criterion, there are other facts which seem to contradict these statistics: for example, out of 641 births 339 were illegitimate, but of these illegitimate children 113 were legalized

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later by marriage. As a race the negroes of Curaçao are as good-natured, indolent and honest as others of that race who live in a tropical climate.

The language is a patois, called Papiamento and is a curious mixture. From the Jews it received some Portuguese words, from the English some English words, from the governing class some Dutch, and from the mainland the basis of the language, which is Spanish. A French word is used occasionally. But the vocabulary is very small and the language is spoken of as a "baby language."

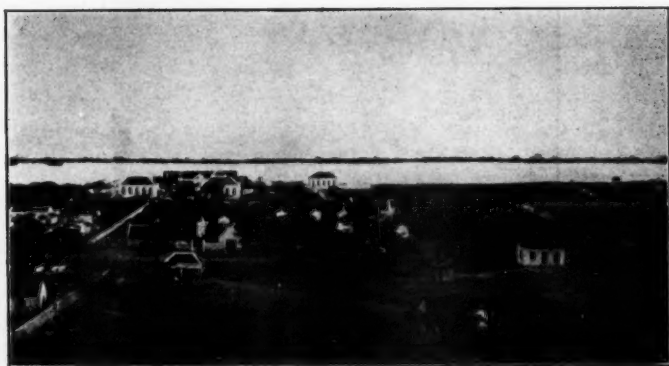


A NARROW STREET IN WILLEMSTAD.

"The peculiarity of the verbs is that they have no simple tenses except the present tenses of the subjunctive and the imperative." The language is spoken by all Curaçons, though practically every one seems to speak and understand Spanish. It will be difficult to find a recent language which is such an admixture of languages. Other languages, such as English, are composite, but they are the result of hundreds of years of growth and modification, whereas Papiamento had its beginning little more than 200 years ago.

One wonders what 30,000 people can find to do to support themselves on a semi-arid island of 214 square miles. The most conspicuous employment, to the traveler, is the washing of clothes. This occupation is carried on with such difficulty, because of the scarcity of fresh water, that a brief account of the method may be of interest. The clothes are first washed in a small quantity of fresh water, which is used until it has almost the consistency of jelly. They are then taken to the seashore where they are rinsed in the sea water and beaten with paddles until all the dirty water disappears. After this process they are allowed to bleach in the sun before being rinsed in fresh water for the final drying and ironing.

The harbour of Willemstad is usually well crowded with small



AN ISLAND OFF THE COAST NEAR WILLEMSTAD.

sailing craft which trade with the mainland of Venezuela and Colombia. The crews of these vessels are for the most part natives of the island.

Another occupation which is conspicuous because of the fact that it is carried on in the street in front of the houses and on the roads, is the making of a coarse kind of "Panama" hats, which are exported in considerable quantities. This industry was introduced by the government some years ago and instruction is still given. The grass from which the hats are made is largely imported from Cuba.

Although the country is a semi-arid one and the most conspicuous objects, as one drives through the country, are the cactus hedges, divi divi trees and poor cottages of the natives, nevertheless, the amount of vegetables and corn produced must be considerable and furnishes employment for a large proportion of the people. Not enough is

produced, however, to support the population, fruit and grain being imported from Venezuela and other countries.

The recent severing of diplomatic relations between the Netherlands and Venezuela and the seizure of Venezuelan vessels by the Dutch grew out of the fear that Curaçao might lose the trade of that country. Ex-President Castro's order that goods trans-shipped in Curaçao could not enter Venezuelan ports meant the ruin of the merchants of the island. Thereupon the mother country took the above action, which, with another country, would have been equivalent to a declaration of war, in order to prevent such a calamity.

There are three principal reasons and several minor ones for the



A TYPICAL COUNTRY LANDSCAPE.

Showing the usual cactus hedges which border the roads.

importance and prosperity of Curaçao in the past. The first is its geographical position, especially with reference to Colombia and Venezuela, together with the possession of good harbours. Second (without which the first advantage would have been negative), the fact that the government of the islands has been stable, while that of the countries on the mainland has been unstable and the import duties excessive. Third, because the Netherlands has been willing to pour money into the island to make it prosperous. The first condition will remain but the other two must, in time, pass away. Ever since Willemstad was made a free port "it has been a sort of inter-

depôt or free distributing point of commerce between the northern states of South America and the Antilles, Europe, and the United States." It has long been a refuge for Venezuelan patriots. Bolivar, Paez, Miranda, Sublet, Guzman Blanco, Riero and other Venezuelan "revolutionists" have spent their leisure time there making plans for future action.

The cost of Curaçao to the Netherlands government is said to be between \$150,000 and \$200,000 per year more than it receives in revenues. Without this aid, even under present conditions, much difficulty would be experienced in paying the expenses of the government. If, however, the governments of Colombia and Venezuela become stable and honest and a more liberal tariff policy is adopted there seems little doubt that the trade of Curaçao will fall off to such an extent that the exporting and trans-shipping firms will be obliged to discontinue their business. Since the city of Willemstad depends largely upon this export trade for its prosperity, and the country people on the city, the effect of such a condition is obvious.

The recent trouble with Venezuela, as has been said, may be traced back to this losing fight with modern conditions. Without Venezuela's trade the island cannot prosper. The Netherlands realizing this, attempts to force Venezuela to permit the trans-shipment of goods at Curaçao. This she has succeeded in doing, but it is, at best, a temporary relief, and Curaçao will in time be obliged to yield to the inevitable and take the place that her geographic position and climatic conditions have ordained—a lonely island, with little political or commercial importance, and a small and poor population. During the transition from the unstable political and social conditions of a new continent, with its temporary lack of geographic adjustment, to those of social and political stability, Curaçao assumed an importance which will, with the progress of civilization and political integrity on the continent, soon be little more than a memory.

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## THE RELATION OF GEOLOGY TO TOPOGRAPHY.

BY

LAWRENCE MARTIN.

Professor D. W. Johnson and Mr. F. E. Matthes have made a strong argument in behalf of the proposition that topographers and engineers need to have geological knowledge for their guidance in constructing maps (Breed and Hosmer's "Principles and Practice of

Surveying," 1908, Vol. II, Chapter VII, 246-266, John Wiley & Sons, New York). Professor Johnson supplies the text here summarized and Mr. Matthes illustrates it with a very effective series of maps (Figures 82-95) showing good and poor methods of mapping the same region. Two of the maps are reproduced in this review by permission (Figs. 91, 92).

It is shown that since engineers, topographers, and other makers of relief maps are unable accurately to present on their maps the whole detail of the surface features of the areas mapped, they are compelled to generalize or sketch much of the topography and they can produce the best results only when they understand the close relation between topography and the branch of geology known as physiography. The topographer must be highly skilled in order to work adequately from a small number of accurately located points, so that he can decide what is characteristic and must be put into his sketch and what is trivial and should be left out. This involves a knowledge of land forms or, as an earlier writer has phrased it, "of the materials in which topography is cast, and of the agencies that shape it."\*

Attention is called to map expression and to the ease of losing it and to the danger of drawing unnaturally rounded or unnaturally angular contours unless the topographer's eye is trained to detect the critical changes of trend and slope which a knowledge of the way the hills were formed will supply. This is illustrated by two maps drawn to show meaningless contours, in one case too rounded, in the other, too angular. The selection of an adequate scale and contour interval has to do not only with the success of the map but with its adequacy for the use intended and with the cost of preparation. As an illustration of this, the texture of topography, shown by two maps, is discussed in relation to rock, climate, and the time element and the necessity to the map-maker of a knowledge of these factors is emphasized.

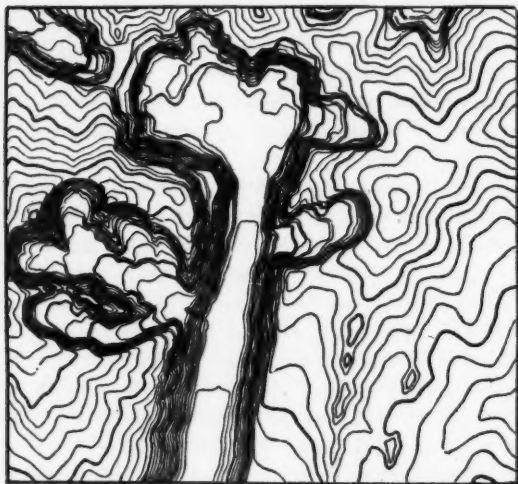
It is pointed out that the working topographer, whose knowledge

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\* Col. Burrard and Mr. Hayden, superintendents, respectively, of the Trigonometrical Surveys and the Geological Survey of India, present the same idea in their "Sketch of the Geography and Geology of the Himalaya Mountains and Tibet," Part 2, "The Principal Mountain Ranges of Asia." They write:

"A draftsman can no more draw mountains without a knowledge of their structure than a landscape artist can draw a village scene without perspective, or than a figure painter can draw men and animals without studying their anatomy. If we attempt to cover many square yards of paper with hill-shading, without having a knowledge of the governing lines of structure, we only succeed in presenting a chaotic mass of incoherent details. \* \* \* The difficulty in mountains is to *see*, and long experience is necessary to give the power of doing so. The untrained eye will see details readily enough, but it will miss the governing lines. In small scale representations we require the governing lines, not the details."—THE EDITOR.





CONTOUR MAP SHOWING INDEX FORMS OF ALPINE GLACIATION.

"This map indicates that the region represented has been greatly modified by Alpine glaciers, for the principal index forms of Alpine glaciation, except the lakes, are sharply brought out by the contours."—JOHNSON.



SAME REGION AS ABOVE, POORLY MAPPED.

"This map of the same region is so far generalized that the hanging lateral valleys are lost, the Alpine character of the mountain peaks is obscured, the U-shaped cross-profile of the main valley is poorly shown, while several of the cirques have lost their most essential characteristics. The first sketch makes clear the kind of land forms to be found in the region. The second does not."—JOHNSON.

of the origin of relief is sufficient, may develop a series of index forms that will serve as keys to the history of a whole region. These may not necessarily be prominent features, but their appreciation is essential. Alluvial fans, triangular facets on mountain spurs along a fault line, and circular rows of hogbacks to distinguish dissected, domed mountains from dissected volcanoes, are among the index forms cited. They are shown by pairs of maps in correct and incorrect form in the text-book.

The two illustrations by Mr. Matthes, reproduced in this review, showing index forms in connection with glaciated mountain areas, are far more eloquent than words. It may be well, however, to explain the significance of these figures rather more fully than the authors had space to do.

While glaciers occupy a region they deepen main valleys more than side valleys, because of superior erosive power by the larger ice tongues. When such glaciers melt away they expose the discordance between valleys and their tributaries, the latter being called hanging valleys. They are now well known in all glaciated regions of notable relief. The contours should extend straight across the mouths of such hanging valleys without bending upstream, as they do in normal valleys. The topographer familiar with this index form will draw his hanging valleys correctly, as in the upper figure. The topographer without this knowledge will represent them as in the lower figure.

Now it happens that railroads are notably affected by hanging valleys. The Delaware, Lackawanna and Western R.R., for example, had to build an awkward switchback at Ithaca, New York, to ascend into one hanging valley; the railway crossing the Alps by the St. Gotthard Tunnel had to excavate no less than seven expensive spiral tunnels because of the height of the hanging valleys there. An engineer whose topographic map did not show these features would, therefore, run grave risks in representing such hanging valleys inadequately, as scores of them have been represented on U. S. Geological Survey maps, for, if the tributary valleys had been sloping, as in the incorrect lower figure, the railway switchback and the spiral tunnels referred to would probably have been unnecessary. In the two figures one needs only compare the representation of the precipitous cirque walls, the flat valley bottoms, the oversteepened valley sides, the narrowed arretes, etc., to see what is meant by adequate and inadequate representation of these forms. It is well known now that eroding glaciers produce all these forms and they may, therefore,

serve as types for intelligent use by other topographers working in similar glaciated areas.

As proof of the validity of the arguments used by Johnson and Matthes one has only to compare the latter's splendid U. S. Geological Survey maps of glaciated forms in the Rocky Mountains, of stream work and weathering forms in the Grand Canyon of the Colorado, and of similar features in the Yosemite Valley, with poorer maps by other topographers who do not know the geology and physiography of what they map.

## REGIONAL POPULATION GROUPS OF ATACAMA,\* PART I.

BY

ISAIAH BOWMAN.

Assistant Professor of Geography at Yale University.

### INTRODUCTION.

The brilliant generalizations of the historian Buckle touched almost every aspect of the department of knowledge in which he laboured and the people of well-nigh every land. An extremely suggestive view which he entertained concerning the backwardness of South Americans is full of interest to-day when this phase of our neighbour's civilization is of such wide current interest. He regarded South America as peculiar, in the sense that man was overburdened, one might almost say overawed, by Nature as upon no other continent. The tropical forests are too vast, in Buckle's view, the mountains and plateaus too high, the deserts too arid, for man's successful conquest.

The intimate student of South American problems at once frames a host of objections to this sweeping generalization, for, while it can not be gainsaid that the physical conditions of that continent are of fundamental importance in the development of its people and the

\* There is no single name for the west coast desert of South America. Portions of it are called the Desert of Atacama, the Pampa de Tamarugal, the Desert of Tarapacá, Tablazo de Ica, etc. Some generic term is badly needed. The phrases "the west coast desert of South America" or "the desert of Chile and Peru" are highly unsatisfactory. The former is cumbersome, the latter includes with the coast deserts the mountain and plateau deserts which are of a totally different type. I propose that the most common term and the one which now includes the largest unit of this elongated desert be used to designate the whole. Few now use the word Atacama in the restricted and precise way in which it is used in Chile. A further slight extension of its meaning would supply the much-needed term. If at any time it is desired to use the word Atacama in its old restricted sense the phrase "The Desert of Atacama *in Chile*" might be taken as a reasonable substitute.



natural resources of their lands, yet these have not been the sole determinants in holding that important part of the human race to the lesser achievements of the day. Something is due to the initial character of the Spanish conquerors and the spirit of the time in which they wrought; something also, to the torpid Indian character and the too large part of the total population he has constituted in some of the smaller countries; while many lesser and local causes explain the specific conditions prevalent in certain unhappy sections of that country to-day.

Yet, when the South American equation of condition is balanced, it is found true on the whole that physical environment constitutes one of the great factors in it, taking at least equal rank with the others; and that the environing forces of earth, air, and water have strongly and persistently moulded the will and the deeds of its people.

The President of the Royal Geographical Society,\* in 1883, mentions Buckle's assertion only to suggest that later exploration might show it to be untrue. Already the impassable Andes of Buckle's day were being crossed, the illimitable Amazon forests were being penetrated and delimited and the stark deserts of the Pacific seaboard were being minutely explored for the wealth of nitrate they contained. It is customary to say that this is human conquest, that thereby man is bending Nature to his will, that he is annihilating what formerly overawed him. Such a view excludes the truth quite as effectually as the view it seeks to displace. For, even if railroads are run across the mountains, the desert reclaimed by scientific methods of irrigation, and rubber in enormous quantities gathered on all the highways and byways of a once impenetrable forest, all these are done by such methods and at such expense of human energy and capital, even of life, as to make them examples not of sheer human conquest, but of a conditional conquest. Nor can even these modifications be accepted as conquest performed by peoples who really inhabit the forests, mountains, and deserts. They are the performances, immediate or remote, of the sterner races, whose tastes have led them to the exploitation of many precious substances in lands that have long held the original races in a thralldom practically complete. The conquering influences are, therefore, of exterior derivation among peoples affected by difficulties like the indigenous peoples, but persisting in spite of them, because of the urgency of their needs.

No trade in the world, says Colonel Church, one of the authori-

\* Lord Aberdare in commenting on a paper by Markham on Explorations of the River Beni in 1880-1881, *Proc. of the Royal Geog. Soc.*, Vol. 5, 1883, p. 347.

ties on South American geography, is carried on under such difficulties as those attending the production and transportation of the rubber of the Amazon basin. It has taxed the courage and endurance of the men engaged in it to an incredible extent:

It represents a continuous struggle under conditions which every year impose greater loss of health, life and material than an active military campaign, and the human suffering is appalling.

This statement from a scholar, who knows the Amazon basin thoroughly through explorations extending over many years, is an emphatic corrective to any notion that defiance of the elements is the rule in South America to-day. Nature, it would appear, continues to stamp her character upon the achievements of men.

Therefore, to whatever extent Buckle's conclusion may be modified in its specific application, it forms on the whole a most suggestive



AN ISOLATED REED AND TURF HUT, SOUTH OF ETEN, PERU.

The owner gathers guano in the coast hills a half mile west of his home and sells it to the farmers in the irrigated Chancay Valley, a few miles inland. The light bamboo roof serves as an awning. It is built for shade and not for shedding water, for it never rains in this desert. The nearest approach to rain is the occasional heavy mist that collects mechanically upon the surface in sufficient quantities, in rare localities, to form a barely visible run-off.

view in the study of South American affairs, particularly in the case of the central Andes, where natural contrasts of hard conditions are not the exception, but the rule. Here the control of Nature over at least the indigenous population is in certain localities complete, and man is actually, as Buckle said, "overburdened" by the harsh environment in which he lives.

The foregoing considerations of Man and Nature, and their interplay, will serve to introduce the complicated relations of the population units of the west coast desert of South America. These relations are not only of man to space and physical circumstance, but



also those of man to time and of man to man. From the rude mud and reed shelter which some lonely dweller calls home it is a far cry to the well-built, well-stocked, electric-lighted and generally comfortable oficinas of the English on the nitrate pampas of Atacama and Tarapacá. The modifications worked by the superior race upon the inferior wherever there has been contact have been sudden and far-reaching; but out beyond their sphere of influence, in the isolated villages of the desert oases and lonely mountain valleys one could well and soon forget that such a people as the English ever commercialized the population groups near the sea. The unaffected groups still follow the old callings and ways of life and how far these are controlled by physical environment it is the chief purpose of the following pages to show.

#### PHYSIOGRAPHIC FEATURES OF THE DESERT OF ATACAMA.

The general physiographic description of the land forms of Atacama, their origin and stage of development, form the subject of a separate article. Therefore only those physiographic features are here discussed which exercise an unusual influence upon the population groups of Atacama. These features or factors are primarily climatic, at least in their immediate effect, and only ultimately topographic. For, while the topography of the Andes gives the climate its pronounced character, it is the climate and not the topography which is of immediate concern to the people. A second great physiographic factor and one whose operation is nowhere in the world more clearly illustrated than in that portion of the west coast desert east of Iquique, and known as Tarapacá, is the space relations of the water courses to each other, the sea, and the mountains; and hence the space relations of the population groups so intimately associated with them. These space relations, as will be seen in the closing paragraphs, at times overshadow every other factor, though they in turn rest back upon topography and climate as fundamental causes: topography, as intensifying the aridity and rendering it excessive as compared with most all of the other deserts of the world, as well as controlling the spacing of consequent streams; climate, as making agriculture, and indeed grazing, impossible beyond the influence of the life-giving streams and thus throwing the whole burden of subsistence upon the watered areas more or less isolated in horizontal space. Between the oases there is little to be gained and much to be lost in applying energy to the conquest of sheer space.

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The west coast desert of South America is unique among the deserts of the world for its elongated quality. It stretches through 27 degrees of latitude, is over 1,600 miles long, and but 50 to 100 miles wide, a narrow strip of bleak, inhospitable, rainless coast. In journeying southward from Panama one discovers it with startling suddenness. At Guayaquil one sails through wide, green, river lanes, bordered with tropical verdure; and cattle graze on all the hills and grassy flood plain tracts within reach of the eye. A single night's journey to southward by steamer and one catches sight of the tawny foreland of Talara, with its city of petroleum derricks, and a few hours later anchor is dropped at Payta, the chief port of north-western Peru. For the tropical foliage of the Guayas Valley at



FLOCK OF GOATS AND SHEPHERD, EAST OF PAYTA, PERU.

The goats live upon short grasses, thinly scattered about during the wet season of approximately every seventh year. The rest of the time, as in the view, they range widely, feeding upon the freshly grown and more succulent parts of desert shrubs and bushes.

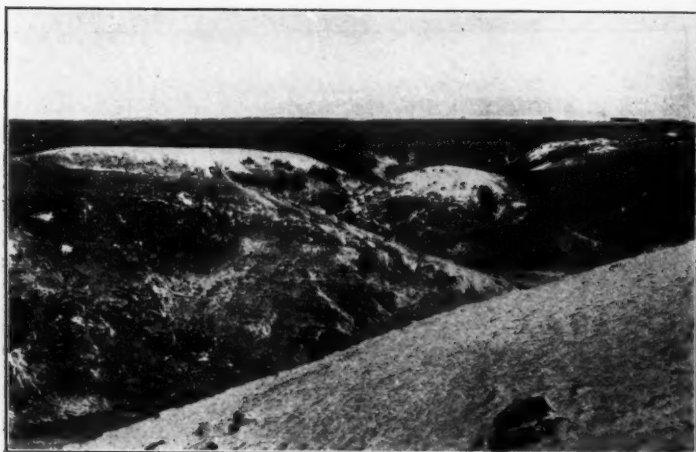
Guayaquil one has here only a few scattered drought-resisting bushes on a plain of yellow sand; for the great herds of cattle only meagre flocks of scrawny goats, and for the rivers and brooks of Ecuador only the dry water-courses of the well-nigh rainless coast desert of Peru.

The precise degree of rainlessness which one may ascribe to this coast desert is a matter of some difficulty to determine. It is asserted by reliable residents that it rains but once in a ten- or twelve-year period, and that there is then no appreciable run-off.

In 1906 there was a three-days' "rain" at Iquique with a perceptible run-off. There were successive light showers with intervals of extremely heavy mist. On account of the heat the houses are built

in very open style to permit free circulation of the air. Consequently, the rains and the mechanical collection of the penetrating mists mean the wholesale destruction of rugs, carpets, wall paper, and the like. It is impossible to keep out the moisture. The same disagreeable features are reported at Lima when the especially heavy mists of the winter season are driven in from sea.

Sievers\* records the yearly rainfall average for Copiapó, Chile, toward the lower end of the desert, in latitude  $27^{\circ}$  S, as 10 millimetres, or less than a half inch. At Payta, Peru, it is said to rain on an average about once every seven years. Frequently the published accounts of these deserts ascribe to them a condition of utter rain-



LOOKING SEAWARD DOWN ONE OF THE GORGES BACK OF MOLLENDO IN SOUTHERN PERU.

The white patches on the spurs entering the gorge are borax drifts blown from deposits of borax on the gorge floor further upstream.

lessness. Ball† compares the hard-featured landscape of Tocopilla to that which an observer might see upon the moon, and suggests that those who feel curious as to the moon's appearance will be gratified by a view of this scenery. The accompanying view represents borax drifts on the spurs of the gorges back of Mollendo, a substance so easily carried away by water as to make its presence in this form a safe indicator of a high degree of aridity. From an examination of the surface southeast of Arica there appears to have been no run-off due to local rain for hundreds if not thousands of years upon a tract

\* "Süd- und Mittel-Amerika," p. 62.

† "Notes on a Tour around South America," *Geog. Journ.*, Vol. 4, pp. 624-626.

several hundred square miles in extent. There is a complete absence in this particular locality of the slightest sign of running water. Considering Newell's\* statement that "even so small an amount of rain as 0.1 inch will cause running water on lands denuded by excessive grazing" as authoritative and as applicable to these undissected surfaces, the exceptional aridity of this desert is at once apparent.

Even at Payta and Copiapó, at the extremities of the desert, the rainfall is exceptionally large and one must not take the rainfall conditions at these places as an indication of the general hyetal condition over the intervening 1,500 miles of desert. The infrequent rains of Payta, at the northern end of the desert, are clearly due to the occasional migration of the equatorial rainbelt to a more southerly position than usual. This brings Payta within the extreme margin of the rainy tract, while the rainfall of Copiapó, at the southern end of the desert, is due to a similar exceptional position of the northerly margin of the belt of westerlies in their annual northward summer migration. The marginal disturbances of this rainy belt produce a light and uncertain rainfall north as far as Copiapó, where the phenomenon of a rainy day has been well described by Treutler.† Between these two extremities the climatic conditions are under the absolute dominance of the southeast trades and the lofty Andine Cordillera. This portion of the desert is in the wind shadow of lofty plateaus and mountains. The moisture which the winds bear from the Atlantic is precipitated upon the coastal margins of the mountains and tablelands of Brazil or the eastern slopes of the Andes. The winds, therefore, have a drying effect and desiccate in proportion to the height of the barrier mountains from which they descend. Since the Andes are the loftiest and most continuous mountain belt of tropical lands, and by their northerly trend the more effectually shut off the rainfall of the easterly trades from the lands in their lee, it is easy to see that few, if any, of the tropical deserts of the world are so arid as that of the west coast of South America.

Up in the mountains the prevailing winds at night and during the forenoon are the trades and are in the southeast quadrant. Late in the afternoon a wind from the northwest springs up which is always cold and raw. On the pampa at Lagunas the wind conditions were in a general way similar. Between 1:00 and 3:00 P. M. a very sudden change occurs, the wind shifting to west or northwest, the indraught from the sea to the superheated land. At Santa Fé the

\* "Irrigation in the United States," F. H. Newell, 1902, p. 45.

† Fünfzehn Jahre in Süd-Amerika. Part I, chap. xx, "Ein Regentag in Copiapó," pp. 135-136.

change occurs at 3:00 P. M., but the wind almost invariably comes from the north and is called "the pampa wind." It is very hot in summer and is always accompanied by great clouds of dust whirled several thousand feet aloft, giving the air a yellow tinge. Frequently the view of the distant Andes is completely shut out. At Lagunas the west wind of summer afternoons blows almost directly from the sea and is cool, but by the time it reaches Santa Fé it has traversed 70 miles of desert and is very hot and disagreeable. These winds gradually diminish in strength after the first blow and die away late in the afternoon or at sunset.



A GENERAL VIEW OVER THE DESERT OF TARAPACÁ, LOOKING NORTH FROM  
THE TRAIL EAST OF PICA, CHILE.

The sand dunes are marching east against the prevailing winds. This is due to greater strength of the ocean breeze of summer. It is this ocean breeze and not the gentler and more prevalent trade wind that does the most conspicuous wind work throughout the desert of Atacama. The lifelessness is absolute; not a single spear of grass or a single hardy shrub finds it possible to survive. For a good discussion of the difference in carrying power in winds of different velocities see an article, entitled "Relation of Wind to Topography of Coastal Drift Sand," by Pehr Olsson-Seffer, in the *Journal of Geology*, Sept.-Oct., 1908. Vol. 16, No. 6, pp. 549-564.

The dust-laden atmosphere results in wonderful sky effects, the marvel of desert scenery. The painted skies of dusk are the great reward of the desert traveler. The peculiar yellow light of sunset at first gives its colour to all objects on the pampa and the distant mountains. As the sun sinks lower, the effects become magical; the plain darkens; only the distant hills receive light of whose changing

colours the pampa dweller never tires. The yellow becomes orange, then magenta, and, finally, purple, and, above all, the majestic snow-clad peaks glow in the fading light like great diamonds set upon the purple hills.

At higher elevations, along the arid flanks of the western Andes that constitute the eastern border of the desert, rainfall occurs in appreciable but unascertained quantities; and in the southern winter, snow occurs at intervals of a few weeks as far down as 11,000 or 12,000 feet. The rains on these western mountain flanks occur at



THE OASIS OF MONTE LA SOLIDAD (MOUNT OF SOLITUDE), 100 MILES SOUTHEAST OF IQUIQUE, CHILE.

There is no surface stream here for most of the year, but natural sub-irrigation supplies the various trees and shrubs that manage to survive. Drinking water is obtained from a ten-foot well that reaches the ground water. A single family of three lives here upon a few vegetables and the returns of the meagre flock of goats that feed upon the xerophilous shrubs scattered about. Cultivation was formerly far more extensive, as may readily be seen from the widely distributed marks of irrigation; but the population has been largely drawn off to the Lagunas nitrate works 25 miles to the north.

lower elevations, at 8,500 feet and from 20 to 70 miles from the sea, where a thin sprinkling of vegetation is to be found, which increases with altitude to a notable degree. Even down on the nitrate pampa, scattered and extremely light showers are occasionally experienced on the higher portions. At 3,500 feet on the trail from central Lagunas to Pique we noted indubitable evidence of recent run-off in the form of freshly outlined but then dry rills and recent alluvial fans not yet sun-cracked or concealed by the shifting sand near by.

But such occurrences are to a high degree exceptional at this elevation.

In general, there is no vegetation whatever on the coast pampa except where the mountain streams come down or when, as in exceptional years, great areas are flooded by the swollen upland streams that then discharge their waters far and wide. From the oasis of Monte la Solidar, 25 miles below Central Lagunas, to the oasis of Quillagua, in the valley of the Loa, 50 miles to the south, there is not the slightest sign of grass or shrub—a truly lifeless desert. Except for the scattered oases there is thus a virtual absence of vegetation of any sort from the 8,500-foot level down to 1,500-2,000+ feet. At the latter height another belt of vegetation appears, owing to the cloud bank that almost perpetually hangs like a pall over the common edge of land and sea. It is often 5-10 miles wide and ranges in elevation from sea-level to over 2,000 feet. The natives speak of it as the poncho (cloak) of the sea, nightly drawn over its head. It is a persistent feature of the whole arid coast and is explained by the contact of the warm wind of the land with the unusually cold waters of the Humboldt Current that sweeps northward nearly to the equator.

It is a feature of great scenic interest, especially if one obtains, as from above it, a view of the dark islands and promontories of land projecting through the white sea of fog. So constant is the bank of cloud and so regular its position, that a thin belt of xerophilous shrubs occurs at this elevation and owes its existence to the mechanical collection of moisture upon the surface of the ground. The cloud particles adhere to the surface and to the plants, and are absorbed in some quantities by the earth, which is perceptibly moistened thereby. Evaporation from the ground is reduced not only by the shading effect of the cloud cover with respect to the sun's rays, but also by virtue of the high relative humidity its presence denotes. This feature was examined with much interest back of Mollendo, where numerous droves of donkeys and several herds of cattle were found subsisting upon the thin grasses and resinous shrubs whose range was clearly marked out on the mountainside. Above this level, as below it, is the naked desert. Darwin, on a trip across the coast ranges back of Iquique, notes the absolute lack of vegetation for 14 leagues except a few minute yellow lichens found growing upon the bleached bones of the mules' skeletons beside the trail.\*

\* "A Naturalist's Voyage, Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H. M. S. *Beagle* Round the World," London, John Murray, ed. of 1890, p. 348.



The nitrate pampa of northern Chile (3,500+ft.) lies at the intermediate level between 2,000 and 8,000 ft., where lifelessness is the rule. Everything needed in the nitrate business must be imported.† There is no timber, no drinking water, no herbage for cattle, no wild animal life whatsoever. At Central Lagunas water is brought in pipe lines from Pique, 18 miles northeastward; fruit from the oases of Pica and Matilla, 55 miles in the same direction; and fish from the sea at Iquique, 90 miles by rail. Except for these three slender resources locally supplied, all the food and clothing, the building material, machinery, work animals, labourers, everything, must be



CROSSING A SALAR IN THE DESERT OF TARAPACÁ, SOUTH OF MONTE LA SOLIDAD, CHILE.

These buckled surfaces are often of pure salt, whose glare tries the eyes of men and animals like snow. It is extremely rough and constitutes one of the most trying bits of the desert.

drawn from more favoured lands. Here, as we shall see, is a condition common to many places along this naked coast and one which constitutes the most important geographic influence in shaping the political fortunes of the region.

In contrast to these inhospitable conditions of the great intermediate areas of the coast desert are the more favourable conditions which obtain at the northern and southern extremities, where the

† The nitrate industry and its geographical relationships is a subject too extensive and too involved with exterior forces to be an appropriate topic of discussion in connection with the population groups of Atacama. It will be treated in a later paper devoted exclusively to this interesting problem.



transition is made to the belt of equatorial rains on the one hand and the belt of westerlies on the other. These border lands are often the most attractive fields of study by virtue of the more varied and mixed responses of their denser populations. Their chief features will be noted here by way of contrast to the special qualities of Tarapacá.

The three typical population groups of Atacama discussed in the following pages are not to be taken as the only types found there. There are at least two other types and a short series of sub-types. But the three chosen have a purer dependence upon natural conditions and are perhaps the most interesting of all. At least one other type is of great importance—the valley type of the coast of Peru, south of Payta, where extensively irrigated farms are cultivated and where the staple products are sugar, tobacco, cotton, rice, fruits, cattle, and the like. Both their interior and exterior relationships are, however, controlled to a notable degree by political, social, and commercial factors of a different order of importance than those here treated and hence will be described separately in a later paper.

*(To be continued.)*

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## GEOGRAPHICAL RECORD.

### AMERICA.

THE SOCIETY'S COLLECTION OF FOREIGN GEOGRAPHICAL APPLIANCES USED IN SCHOOLS.—This collection of wall maps, atlases, and text-books used in the schools of some of the leading European countries has been on exhibition, with excellent educational results, for two months in the house of the Society. It will be seen during the spring and summer in some of the Universities of the middle West.

The collection has been loaned to the University of Wisconsin, where it will be exhibited at Madison from May 1st to June 15th. It will then be sent to the Ohio State University at Columbus, where the exhibition will open on June 21st and continue until July 10th. From there it will go to the University of Chicago, where the exhibits may be studied from July 16th till the middle of August. It is expected that lectures will be given on the collection at each of these institutions and that many teachers in Western schools will have ample opportunity to become familiar with the excellent features of these products while in attendance at the sessions of the summer schools held at the Universities. Arrangements for the exhibition of the material are being made at other educational centres in various parts of the country.

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WATERWAYS TREATY BETWEEN THE UNITED STATES AND GREAT BRITAIN.—The treaty for the settlement of the waterways differences between the United States

and Canada was signed at Ottawa early in January by Mr. Root and Mr. Brice. The treaty concerns the control and division of the waterways along the boundary between Canada and the United States and provides for the settlement of Niagara power disputes, the navigation problem of the Great Lakes and frontier waters, and the uses of the same waters for reclamation and other purposes. Further disputes, if any, are to go to a permanent Joint Commission of six members, the three British members to be appointed by the King upon the recommendation of Canada. In case of an equal vote on a matter of dispute, the question is to be referred to an umpire.

The earlier Waterways Commissioners had recommended that the limit of Canada's rights to take water from the Niagara River should not exceed 36,000 cubic feet per second and, in order to preserve the American Falls, a limit was suggested of 18,500 cubic feet per second for the United States. The latter provision has been increased by the new treaty to 20,000 feet per second as experiments made last summer demonstrated that the effect on the American Falls of the diversion of water was less than had been anticipated. Canada received 16,000 feet per second more than her neighbour, and this will enable the three companies on the Ontario side to develop 425,000 horse-power, as against 236,000 on the New York side. The treaty will take effect when ratified by the two powers.

As the treaty is regarded as somewhat experimental, it was decided to confine its operation to five years, with the expectation that its existence will be continued if the results are satisfactory.

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FLORIDA STATE GEOLOGICAL SURVEY.—The first annual *Report* of this Survey, which was established in 1907 with E. H. Sellards as State Geologist, has been issued at Tallahassee. The Survey is intended to serve both economic and educational purposes. Full provision has been made for the exploration of the mineral and other natural resources of the State and for the publication of the results. While economic purposes are thus emphasized, it is also made the duty of the State Geologist to collect specimens illustrating the geological and mineral features of the State, duplicate sets of which are made accessible to each of the State colleges. It is intended through the publication to supply the people with a better knowledge of the resources of the State and of their possibilities and limitations.

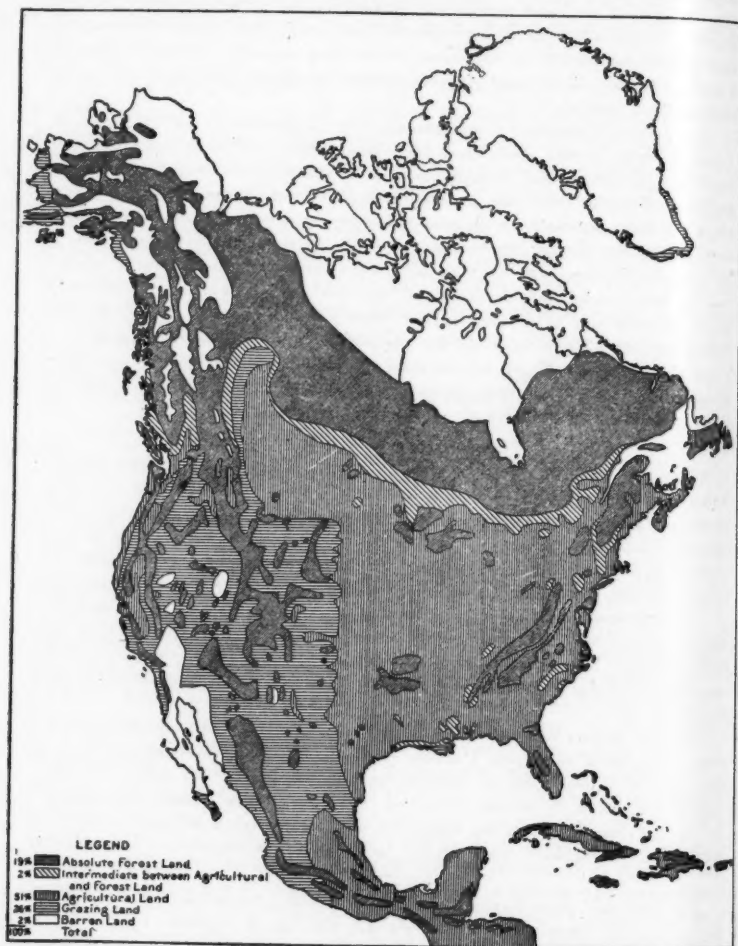
The first *Report* contains an illustrated summary of Florida's geological features and mineral industries, a history of earlier geological investigations in the State and a bibliography of Florida's geology containing 212 titles. A short account is given of the results of the first year's work. The special investigations during the year will form the subject of separate publications, one of which, a bulletin on underground water-supply, accompanies the *Report*.

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THE FUTURE USE OF LAND IN THE UNITED STATES.—Under this title, the Forest Service of the Department of Agriculture has issued Circular 159, by Mr. Raphael Zon, chief of the Office of Silvics. The paper is illustrated by the map reproduced here. The following paraphrase of the paper will explain the map and present Mr. Zon's deductions as to the various utilities which our land area may be expected to serve in the future:

He estimates, from the history of our agricultural progress in the past fifty years, that the area devoted to agriculture, in a half century, instead of being 21 per cent. of the total area, as at present, will be nearer 50 per cent. In the east-

ern half of the country, which has less rugged topography and more favourable climatic conditions than the West, the extension of farm land will go on at the expense of the land now occupied by forests but capable of producing crops, and the forest lands proper, in the East, will be confined to thin soil and the steep



PROBABLE FUTURE LAND CLASSIFICATION OF NORTH AMERICA.

slopes of the mountains. In the western half of the country additional farm lands will be won chiefly from the semi-arid lands and not from the forests whose soils and situations are unsuitable for agriculture. On the whole, the Western mountains will always remain chiefly a forest region.

Grazing lands will form about one-fifth of the total area of the United States proper. This land was originally in the plains and mountain valleys west of 100° W. Long. but, with the advance of dry farming, its eastern boundary has been shifted further west to about 103° W. This land receives scanty rainfall and produces neither forest nor field crops but supports hardy grasses. It will remain largely a natural range since the area which can be irrigated or used for dry farming is comparatively small. The Reclamation Service does not expect to reclaim more than 5 per cent. of it. The possibilities for increasing its productivity as a range (300,000,000 acres of grazing land) are very great.

About 2 per cent. of the total land area will forever remain desert. These areas, on account of intense heat, very low temperatures, alkali, or lack of rainfall, are unfit for the use of man. Such land is found about the Gulf of California and in Nevada, Utah, and Oregon in the form of arid basins. There are ice-bound deserts in Alaska and on glacier-covered mountains.

The land chiefly valuable for growing forests will shrink to about 360,000,000 acres which, with the wood-lots attached to farms, will make the total forest area about 450,000,000 acres, or a fourth of the total land area. This reduction of the forest land is inevitable because plow lands must increase with the growth of population. With a population of probably not less than 150,000,000 in 1950 the area under crops must be larger than at present. In the West, except in some areas along the Pacific Coast, the forests will not be reduced because the land there is not very suitable for farming. If it were reduced, the result would be to diminish the farm lands lying below which are dependent upon irrigation. The additional agricultural land, therefore, must come chiefly from the East through improvement of the present unimproved farm and swamp land and at the expense of the forest land proper. The forest area will be confined, more and more, to land which is unsuitable for agriculture but adapted for growing trees. The map shows the areas which will probably remain forest lands.

There are also intermediate lands, in belts and patches, which are neither exclusively forest nor agricultural areas but may be devoted to either purpose as local conditions may make one or the other more profitable. The map shows small areas of these intermediate lands scattered over the country and extending in a wide belt far west of the Gulf of St. Lawrence.

Discussing the timber problem at length, the author says that the waste in the utilization of our timber products is enormous. We waste about 50 per cent. of the total volume of a tree. We are only just beginning to learn the usefulness of many trees hitherto considered worthless. We are also beginning to learn how to prolong the life of ties, posts, poles, and other forms of timber. Fortunately, our physiographic and climatic conditions are such that, no matter how great the demand for agricultural land may be in the future, the area exclusively adapted for timber production will, if properly managed, be large enough to supply all our needs for wood and for the exercise of its protective function in the regulation of stream flow and the protection of the soil against erosion.

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THE HUDSON RIVER VALLEY.—Borings recently made by the Board of Water Supply of the City of New York, in order to determine the best route for the Catskill Aqueduct, have revealed some very interesting phenomena which have been studied by Prof. J. F. Kemp and published in a preliminary paper (*Amer. Journ. of Sci.*, Vol. XXVI, 1908, pp. 301-323). It is found that the gorge of the Hudson is much deeper than the tributary valleys, indicating "hanging valleys

of somewhat striking altitude, and with apparently abrupt drops to the gorge of the Hudson." At the Storm King crossing in the Highlands, where the aqueduct is to cross the Hudson beneath the river, the gorge between the granite buttresses narrows to 2,800 feet. Here a number of borings were made to determine the depth of the gorge. A boring to a depth of 626 feet near the river centre failed to reach the rock floor of the gorge, though others nearer the banks encountered rock and showed the presence of a steeply sloping gorge wall on either side. In the tributaries, on the other hand, no gorges of corresponding depths were found. There is, therefore, a profound discordance between main valley and tributary. As Prof. Kemp points out:

Even giving all possible latitude to these depths [determined by borings], it still remains true, that as compared with the gorge of the Hudson, now demonstrated at the Storm King crossing, all these tributaries entered in the last stages of erosion, either just preceding or during the Glacial Epoch, by hanging valleys of 500 ft. or more above the bottom of the main stream.

Concerning the cause for this great discordance of tributary valleys with the main valley, Prof. Kemp says:

For this region we believe in a rather abrupt elevation of the land in the closing Tertiary which brought about a deepening of stream channels to a point as much below the present as the depths of the exploring holes, above cited, indicate. The Hudson, however, obviously cut much more rapidly than its tributaries, and with this, the temporary diversion of the drainage of the Great Lakes through the Mohawk may have had some influence. The ice-sheet served still further to accentuate the difference, and, as often appears along a trunk glacier, left the tributaries as hanging valleys.

Most glacialists will, I think, feel that Professor Kemp has assigned to the work of the ice-sheet an altogether too subordinate rank. Phenomena like those described are now known to be the result of glacial erosion in many other regions; their explanation by rejuvenation is most difficult, and in this case is confronted by serious objections; and the region under consideration is just the kind of place in which profound glacial erosion is to be expected,—a glacial trough, with a broad flow of ice forced to concentrate its energy in passing through a restricted cross-section. The evidence which Professor Kemp has published seems so clearly to point to glacial erosion as the cause for the Hudson gorge below the hanging-valley levels, that any alternate hypothesis can hardly be accepted unless the glacial erosion explanation is first eliminated by direct evidence. R. S. T.

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#### AFRICA.

PROFESSOR STARR'S WORK IN THE CONGO BASIN.—Prof. Starr, of the University of Chicago, started in September, 1905, on a leave of absence of sixteen months, during which time he travelled thousands of miles in the Congo Free State studying the customs of many tribes, collecting over 3,500 objects of native manufactures and securing about 700 photographic negatives. He is now planning a series of five publications to contain the results of his labours. One of them will probably be devoted to the Congo languages which he had some opportunity to investigate. Another volume will be an African miscellany in which Professor Starr will present a series of studies of various phases of native life and thought.

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#### ASIA.

THE RIABOUSCHINSKY EXPEDITION TO KAMCHATKA.—Mr. Theodor Riabouschinsky, a capitalist of Moscow and a very young man, during his studies in the Moscow University, paid particular attention to anthropology. He conceived the

idea of undertaking a thorough investigation of the Kamchatka Peninsula which is still little known. At the request of Mr. Riabouschinsky the Imperial Russian Geographical Society organized at his expense a scientific expedition consisting of five divisions: Zoological, botanical, geological, meteorological and ethnological.

The zoological division is headed by Peter Schmidt, professor at the University of St. Petersburg. He and his four assistants, representing the different branches of zoological science, are to investigate the fauna of Kamchatka. Komaroff, the chief botanist of the Imperial Botanical Garden in St. Petersburg, is the leader of the botanical division. He has four assistants and will study the flora of Kamchatka and its distribution. The geological division consists of two independent sections. One headed by Krug, a mining engineer, is to study the general geology and topography of Kamchatka; the second section, headed by Konradi of the Russian Geological Survey, is to direct a special investigation of the volcanoes in Kamchatka. The meteorological division, consisting of five members, under the direction of Vlassoff, of the Observatory of St. Petersburg, will study the climate of that country. All these four divisions are already on that peninsula, busily engaged in their respective investigations which will last about two years.

Mr. Waldemar Jochelson (BULL., 1908, p. 753), who has charge of the ethnological work, outlined his programme in a paper read at a meeting of the American Ethnological Society on Nov. 9 last (*Science*, No. 738). He proposed that the area to be studied by his department should include the Aleutian and Kurilian Islands, because the ethnology of the Kamchadal can not be investigated, to any great extent, without the study of the neighbouring tribes. The Jesup expedition, in its endeavours to clear up the history of the American tribes, has already investigated the tribes nearest related to the Kamchadals, *viz.*, the Koryak, Chukchee and Yukaghir tribes, as well as some remotely related tribes, such as the Giliak and Ainu. The nearest neighbours of the Kamchadals in the east are the Aleut. The extreme western Aleutian Islands are separated from the eastern shores of Kamchatka by only about 300 miles, in the centre of which are the Komandorski Islands. The Aleut have as yet not been sufficiently studied.

Another object of his study is to investigate the former relations of the Kamchadal to the Ainu. This can be achieved by a study of the Kurilian Islands. In order to attain this, he proposes to remain only one year in Kamchatka and to devote the other year to the Aleutian and Kurilian Islands. He decided to spend the first year of studies among the Aleut. Under the Russian rule they have been Russianized to such a degree that ethnology has lost considerably. Much, however, can be done even now. We must endeavour, he says, to reestablish the past by a study of what remains of their old habits and customs, and their former family and social relations and material culture. Their language is still available for study, and it is important to define the relation of the Aleut language to the Eskimo dialects. It is also important to make new excavations, considering that Dall has found traces of different cultures on the Aleutian Islands.

He left Seattle on Dec. 8 last for Unalaska, this island and Atka and Attu being the only inhabited islands of the Aleutian chain. For excavation purposes he will also visit some other islands which are not populated at present, but were in the past. In the spring of 1910 he expects a Russian naval cruiser to take him and his party from the Aleutian Islands to the Komandorsky Islands, and from there to Petropavlovsk in Kamchatka. He intends to study not only along the coast, but also in the interior. In the north, he will try to reach the bay of Baron Korf, and in the south to go as far as Cape Lopatka. Everywhere he will



endeavour to make excavations of old Kamchadal villages. In the spring of 1911, he hopes to return to Russia by way of Vladivostok, visiting on the way some of the Kurilian Islands. He has two assistants, one of whom is his wife, who also accompanied him on the Jesup expedition. Mrs. Jochelson will act in the capacity of both physician and somatologist.

**THE JAPANESE VOLCANO Aso.**—In a recent number of *The Journal of Geology* (Vol. XVI, 1908, pp. 499-516), Mr. Robert Anderson describes the remarkable volcano Aso in the centre of Kiushiu, Japan. This volcano is "a huge mound-shaped cone on the summit of which is sunk an oval bowl about ten miles in width, fourteen miles in length and 1,000 to 2,000 feet in depth." It is a typical caldera of huge size, being "one of the very largest, if not the largest, of the craters known on this planet." The floor of the caldera is closely cultivated and on it is the town of Takamori. A mountainous range crosses the caldera, dividing it in two parts, and in this there are several small volcanic cones, one of them being active at the present time. Mr. Anderson describes the volcano fully and publishes numerous interesting photographs. His conclusions with regard to the history of Aso are as follows:

It has been the centre of vast outpourings of lava and fragmental material that have filled a depressed area in the topography of the older formations, building a huge cone in Quarternary time. Formerly there existed a volcanic cone rising high above the present caldera, but by discharge of great lava flows the cone collapsed and the caldera grew in size as the volcano decreased in height. In this explanation the author follows Diller's explanation of the caldera of Crater Lake, Oregon.

Mr. Anderson conceives the process of caldera formation to have been probably "one of gradual enlargement of a summit crater. A fissure line at right angles to the long axis of the caldera has become the seat of subsequent volcanic activity as a result of which has been built the present mountainous range that rises above the caldera floor." On this fissure line "the cone building still continues, though with diminishing vigour, in a modern crater centrally situated with respect to the old one." One of the interesting parts of this paper is a list of other large craters on the earth, with their dimensions.

R. S. T.

#### EUROPE.

**THE FIRST RAILROAD IN MONTENEGRO.**—Two years ago an Italian company in Venice began building a railroad from Antivari on the coast to Lake Scutari. The line was completed and put in operation in December last. It is less than twelve miles long but was a work of great difficulty, requiring a number of long tunnels through the mountains and rising to a height of 1,400 feet above the sea. It is expected that the railroad will command an important amount of freightage as it will be the outlet of all the commerce naturally tributary to the navigable Lake Scutari.

#### POLAR.

**EXPEDITION TO RECOVER THE MYLIUS ERICHSEN RECORDS.**—Early next summer eight men are to sail on a small vessel, from Denmark, to recover, if possible, the bodies of Dr. Erichsen, leader of the recent expedition to northeast Greenland,

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and his companion, Lieut. Hagen, and also to search for their diaries and collections which, it is believed, Erichsen must have left in some secure cache when he was no longer able to carry them. According to information found on the body of the Greenlander Brönlund, the third member of the party, his two comrades died only a few miles to the north of the place where his body was found. It is thought that a memorandum of the place where Erichsen left his records may be found with his remains and, at any rate, it is proposed to search as far north as Denmark Fiord for them. If sufficient time remains, the party will engage in scientific work before returning to Denmark.

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DR. CHARCOT'S EXPEDITION.—The French Antarctic expedition, commanded by Dr. Charcot, sailed from Punta Arenas in the Straits of Magellan on Dec. 17th last. Dr. Charcot's plan was to touch at the South Shetland Islands and then to proceed down the west coast of West Antarctica and attain Alexander I. Land where he hoped, during the rest of the season, to extend his explorations southward along the coast. After spending the approaching Antarctic winter on that coast he will continue his work during the following summer and, if all goes well, he expects to reappear in South America in April, 1910.

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NORWEGIAN EXPEDITION IN SPITZBERGEN.—While Baron de Geer was exploring the basin tributary to Ice Fiord, western Spitzbergen, last summer, a Norwegian geologist, Mr. Adolf Hoel, assisted by Mr. Holmsen, was carrying out geological investigations in the same region where they collected many fossils, the geological series to which their collections belonged being the Carboniferous, Triassic, Jurassic, and Tertiary. Their collection of fossil plants is being studied by the Swedish palæontologist, A. G. Nathorst. (*La Géog.*, Dec. 15, 1908.)

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UNUSUAL INFLUX OF ANTARCTIC ICE IN THE SOUTH ATLANTIC.—Dr. Charcot and the captains of a number of vessels in the South Atlantic have reported the appearance in those waters, during the past few months, of an unusually large quantity of Antarctic icebergs. One of the whaling ships, under command of Captain Larsen, reported that he met in 42° S. Lat. a tabular iceberg rising about 100 feet out of the sea and twelve miles in length. Captain J. B. Pierre, of the French ship *Valparaíso*, reports (*La Géog.*, Dec. 15, 1908) that he met an iceberg in about 50° S. Lat. and 50° W. Long. which was exactly in his path and he had difficulty in circumventing it. He estimates that the length of the floating mass was 72 miles north and south and it extended 25 miles east and west at the end around which he sailed. Captain Pierre says that large icebergs were found in September last to the east and northeast of the Falklands, an area in which many icebergs were seen in the great ice years of 1893 and 1894.

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#### EDUCATIONAL.

A COMMITTEE ON GEOGRAPHY IN SECONDARY SCHOOLS.—At a meeting of the Science Section of the National Education Association at Cleveland in June, 1908, it was voted to appoint a committee of seven to consider and report on the matter of Geography for Secondary Schools. This committee was later appointed as follows: Prof. James F. Chamberlain, Los Angeles Normal School (Chairman); Prof. Mark Jefferson, State Normal College, Ypsilanti, Mich.; Prof. W. C. Moore, Mt. Holyoke College; Mr. R. H. Whitbeck, State Model School, Trenton, N. J.;

Mr. W. H. Snyder, High School, Hollywood, Cal.; Mr. M. W. Field, Milton Academy, Milton, Mass.; and Mrs. Martha Krug Genthe, Hartford, Conn.

R. E. D.

ROUND TABLE DISCUSSION.—The Association of American Geographers, at their recent meeting in Baltimore, devoted an evening to a Round Table discussion of Geography for Secondary Schools, under the leadership of Richard Elwood Dodge, Teachers College, Columbia University. Over three hours were passed in the consideration of the main points outlined in a prepared brief. The success of the meeting was due to the active coöperation of many of the best-known geography teachers of the country. As a corollary to the evening the Association voted on the following day to appoint a Committee of Five to pursue the matter further and to formulate more fully plans for bettering secondary school geography work.

GEOGRAPHY IN THE UNIVERSITIES.—*The Journal of Geography* for December last contained an account of the work in Geography at Yale University, by Mr. Isaiah Bowman, followed by a similar article on Geography at Harvard University in January, by Prof. Robert DeC. Ward.

#### PHYSICAL GEOGRAPHY.

MARGINAL GLACIAL DRAINAGE FEATURES.—In the interpretation of the phenomena of former continental glaciation the deposits left by the glacier have been mainly used by workers in the field. Erratic boulders, moraines and other glacial deposits, together with glacial striations, have been the criteria most commonly studied. Latterly erosional work, both that of ice erosion and of ice-born stream erosion, have come to be recognized as of importance. Along the margins of glaciers, streams of water issue, depositing sediment, in places, and in other places, where conditions favour, eroding. In a hilly country the streams associated with glacier margins often find opportunity for effectual erosion, cutting valleys sometimes in most unusual positions. For example, a stream flowing along an ice margin may find exit across a divide into another valley, cutting down the divide; or, where it is confined by the ice, flowing in a trough with ice for one wall and the valley side for the other, it may cut a valley on a hillslope. When the ice which held the stream up on the valley side is gone, it often seems difficult to understand how a gorge valley could have been cut in the hillslope along a course contouring the hill instead of descending its slope.

In a recent paper (*Journ. Geol.*, Vol. XVI, 1908, pp. 527-548) John L. Rich of Cornell University describes a number of these channels in the Finger Lake region of Central New York, classifying them under five types and giving descriptions of typical instances of each class, with maps and drawings to show their characteristics. Besides the individual descriptions of the several types Mr. Rich brings out three important points in his paper. He shows in one case, in the Seneca Valley, the points at which the glacial streams from the glacier emerged, and uses the marginal channels in determining the ice-front position. As far as I know, this is the first time that this has been done. In the second place, Mr. Rich presents evidence of clear and convincing nature that there are marginal channels of an earlier glacial epoch as well as those of the last ice advance. This is one more proof of the complexity of the Glacial Period.

The third contribution is the proof that ice blocks, buried beneath morainic deposits, lingered long after the ice had ceased to be actively in motion. His proof of this is the fact that an overflow channel from an ice-ponded lake in Seneca Valley, graded to the then existing conditions of the morainic area south of Seneca Lake, is now crossed by a pronounced kettle-hole. Evidently, then, the outflow stream flowed over moraine that rested on ice which had been buried and blanketed by débris; and this lasted during the period required for the glacier front to recede many miles, the buried ice remaining beneath the overflow stream bed until after water ceased to flow through it. These three points are distinct contributions to glaciology and two of them, the first and last, are due entirely to the work done by Mr. Rich, while the other rests in part upon his work.

R. S. T.

#### VARIOUS.

CAPTAIN UMBERTO CAGNI.—This is a portrait of Capt. Cagni who was elected President of the International Polar Commission at its organization in Brussels last year. It will be remembered that Capt. Cagni, now commanding the Italian



CAPTAIN CAGNI.

battleship *Napoli*, was leader of the Duke of the Abruzzi's field party which in 1900 reached the latitude of  $86^{\circ} 33'$  north of Franz Josef Land and the highest north attained up to that time; and that he was also the Duke's associate in the ascents of Mount St. Elias and the Ruwenzori Range in Africa. The Commission is a permanent body whose objects are to establish closer scientific relations

between polar explorers; to secure the coördination of their scientific observations and methods; to discuss the scientific results of expeditions and to render assistance to exploring parties especially by indicating scientific desiderata. The Commission is prohibited from conducting or acting as patron to any particular expedition.

CAPT. H. G. LYONS, Director-General of the Survey of Egypt, has been appointed Lecturer in Geography at the University of Glasgow from the beginning of the next academic year.

SIR T. H. HOLLAND, Director of the Geological Survey of India, has accepted the offer of the chair of geology at Manchester University vacated by Prof. Boyd Dawkins.

*Gaea*, the well-known German scientific monthly, which gives large attention to geography, begins its forty-fifth year with a change of editor, publisher, and place of publication. Prof. Dr. Hippolyt Haas, professor of geology and palaeontology at the University of Kiel, succeeds Prof. Dr. H. J. Klein as editor and the periodical will hereafter be issued by the publishing house of Fritz Lehmann in Stuttgart.

The Seventh *Annual Report* of the Geographic Board of Canada (100 pp.) contains a list of all the decisions as to the spellings of place names in Canada to June 30, 1908.

PROF. W. M. DAVIS's Physical Geography and his Laboratory Exercises in Physical Geography are soon to appear in German from the house of B. Tauchnitz. This is a striking compliment to the leadership of Professor Davis, not only among geographers and teachers of geography, but to his high scientific standing internationally.

R. E. D.

THE AMERICAN GEOGRAPHICAL SOCIETY.—A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday, February 23, 1909, at 8.30 o'clock P. M.

Vice-President Greenough in the chair.

The following persons, recommended by the Council, were elected to Fellowship:

S. W. Hayes,  
Frank L. Dyer,

Edward J. de Coppet,  
The Rev. Dr. James B. Wasson.

The Chairman then introduced Miss Annie S. Peck who addressed the Society on "Huascan and the Peruvian Highland."

Stereopticon views were shown.

On motion, the Society adjourned.

#### OBITUARY.

DR. E. T. HAMY.—This well-known anthropologist died in Paris on Nov. 18, 1908, aged 66 years. He first studied medicine but later pursued anthropological and ethnographical studies under the guidance of Quatrefages. After service as assistant in the Natural History Museum of the Jardin des Plantes, he founded in 1880 the Ethnographical Museum of the Trocadero to which he gave most of his time till 1892. His writings especially contributed to his reputation and among his numerous works are "Précis de paléontologie humaine," "Crania ethnica" and "Les premiers Gaulois." He was conspicuous in some of the leading scientific societies in France and at the time of his death was President of the Paris Geographical Society and of the Society of Americanists.

## NEW MAPS.

### AMERICA.

#### UNITED STATES GEOLOGICAL SURVEY MAPS.

COLORADO.—(a) Geologic Map of Georgetown Quadrangle, 1:62,500; (b) Topographic Map of Georgetown Quadrangle, 1:62,500. Accompany Professional Paper 63, "Economic Geology of the Georgetown Quadrangle (together with the Empire District) Colorado," by Josiah E. Spurr and George H. Garrey.

MONTANA.—(a) Geologic Map of the Great Falls Region, Montana. Scale, 4 miles to an inch. By Cassius A. Fisher and W. R. Calvert. Contour interval 100 feet. Ten colours for formations and for geologic sections. (b) Map of Great Falls Region, Montana, showing Irrigation, Agriculture and Water Resources. Same Scale, and authors. Tints show areas now irrigated, to be irrigated by proposed canals, dry farming and grazing areas, springs, and wells. Illustrate Water Supply Paper 221, "Geology and Water Resources of the Great Falls Region, Montana."

PENNSYLVANIA.—Geologic Sketch Maps of (a) The vicinity of Cornwall, 1 mile to an inch; (b) District South of Reading, 1 mile to an inch; (c) Vicinity of Wheatfield Mines,  $\frac{1}{2}$  mile to an inch; (d) Vicinity of Boyertown,  $\frac{3}{4}$  mile to an inch; (e) Vicinity of Jones and Warwick Mines, 1 mile to an inch; (f) Mesozoic Area near Dillsburg, 1 mile to an inch; (g) Geologic Map of Cornwall Mines and vicinity, 800 feet to an inch (colored); (h) Geologic and Topographic Map of Dillsburg Ore fields, 2,000 ft. to an inch (coloured), contour interval 10 ft. Illustrates *Bull.* 359, "Magnetite Deposits of the Cornwall type in Pennsylvania." By Arthur C. Spencer.

UNITED STATES, WESTERN.—Map of the Mining Districts of the Western States. Scale, 1:2,500,000 or 39.4 miles to an inch.  $29^{\circ}$ - $49^{\circ}$  N.;  $101^{\circ}$ - $125^{\circ}$  W. Compiled by Waldemar Lindgren, assisted by J. M. Hill, V. C. Heikes, C. Naramore, and A. N. Winchell. In "Mineral Resources of the United States, Part 1, 1907." Red and black symbols show the distribution of 19 metallic products.

UTAH.—(a) Topographic Map of the Western Portion of the Uinta Mountains, Utah, showing distribution of glacial formations. 1:125,000 or 1.9 miles to an inch; (b) Portion of Salt Lake Quadrangle, Utah, showing distribution of glacial forms. 1:250,000 or 3.95 miles to an inch. Accompany Professional Paper 61 "Glaciation of the Uinta and Wasatch Mountains," by Wallace W. Atwood.

#### HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Atlantic Ocean, March, 1909. The reverse shows a Chart of the Gulf Stream in the Gulf of Mexico, illustrating the currents there during the different seasons; also items of our port facilities, etc.

Pilot Chart of the North Pacific Ocean, February, 1909. The reverse has articles on "A Substitute for the Sea Horizon" in finding the altitude of celestial bodies by sextant observations; "Deep Sea Soundings," or a substitute for the Kelvin chromate of silver tube; and "Earthquake Seamanship."

Pilot Chart of the North Pacific Ocean, March, 1909. Reverse contains a study of "The Causes of Strandings in 1908," "Avoidance of Excessive Rolling in Ocean Vessels," and "Methods of Observing Waves at Sea."

#### DEPARTMENT OF AGRICULTURE MAPS.

UNITED STATES.—Distribution and Silvical Regions of the Douglas Fir. Illustrates: "Douglas Fir: A Study of the Pacific Coast and Rocky Mountain Forms." By E. H. Frothingham. Shows the distribution of the coast and mountain forms of the Douglas Fir in Nevada, Arizona, New Mexico, Utah, Colorado, Wyoming, Montana, and British Columbia.

MISSOURI.—Geological Map of Missouri. Scale, 11.5 miles to an inch. Missouri Bureau of Geology and Mines, E. R. Buckley, Director and State Geologist, Vol. 6, Second Series, Jefferson City, 1908. Accompanies "the Lime and Cement Resources of Missouri," by H. A. Buehler, Assistant State Geologist. Geology based upon all available published maps and brought up to date.

NEW YORK.—Map Showing Line of Outcrop of Clinton Oolitic Ore in Parts of Oneida and Herkimer Counties. Parts of Oriskany and Utica Quadrangles. Accompanies "Iron Ores of the Clinton Formation," 61st *Annual Report* of the State Museum, Albany, 1907. The outcrop is shown in red. The map scale should have been given.

SÃO PAULO.—Topographic Survey Sheets. Scale, 1:100,000 or 1.5 miles to an inch. Preliminary Edition, 1906.—Sheet São Paulo. 1907.—Sheets Pindamonhangaba, Botucatu, Rio Claro, Atibaia, Guarehy, Jacarehy, Casa Branca, S. Carlos do Pinhal, Jahú, Pirassununga, Campinas. 1908.—Sheets S. Roque, Jundiáhy, S. Pedro, Piracicaba, Ytù. Comissão Geographica e Geologica do Estado de S. Paulo. São Paulo, 1908. Attention has already been called in the BULLETIN to these excellent topographic sheets which the Survey of the State of São Paulo is now producing. They compare favourably with the cartographic results of detailed topographic surveys in other lands.

#### AUSTRALIA.

QUEENSLAND.—Geological Sketch Map of Cloncurry Copper Mining District. Scale, 18 miles to an inch. By Lionel C. Ball, Assistant Govt. Geologist. Accompanies Geological Survey Publication No. 215, "Cloncurry Copper Mining District, Part 2," Brisbane, 1908. A map in colours showing geological formations, boundaries of mineral fields, mining leases, and roads.

#### EUROPE.

CARNIOLA.—Sprachenkarte von Krain auf Grund der Volkszählung von 1900 entworfen von Dr. Martin Wutte. Scale, 1:200,000 or 3.1 miles to an inch. *Deutsche Erde*, Vol. 8, No. 1, Gotha, 1909. Coloured to show the distribution of the German, and Slovenian languages in Carniola.

GERMAN.—Höhenschichtenkarte der Eifel auf Grundlage des von der Königl. Preuss. Landesaufnahme herausgegeben topographischen Uebersichtskarte des Deutschen Reiches von Dr. H. Rauff. Scale, 1:200,000 or 3.2 statute miles to an inch. Friedrich Cohen, Bonn, 1908. Price, 3 M. On this fine map, based upon the German survey sheets, 15 contours of elevation are shown by colours and, notwithstanding the small scale, the large amount of detail is brought out with

perfect clearness. It is a first-rate example of a map generalized from topographic survey sheets and adapted for the needs not only of tourists and the general public but also of geologists and other scientific specialists.

GERMANY.—Die Polen im westlichen Preussen am 1 Dezember 1905. Scale, 1:2,750,000 or 43.4 miles to an inch. *Zeits. des K. Preuss. Statist. Landesamts*, No. 4, 1908. Five tints show density of Polish population.

#### THE OCEANS.

ATLANTIC OCEAN.—Campagne Scientifique de la "Princesse Alice," 4 Mai-Août, 1908. Itinéraire. Mercator Projection. *Bull. de L'Institut Océanographique*, Monaco, 1908. A black and white map accompanying a list of the scientific stations on this cruise with soundings in meters.

#### ATLASES.

Atlas Général Vidal-Lablache.—Histoire et Géographie. Nouvelle Édition. 420 maps and insets. Armand Colin, Paris, 1909. The new edition is being published in 26 parts, of which 7 have now been issued. One hundred and eleven maps and insets appear in the 6 parts just received. The large number of insets and the explanatory text by Prof. Vidal de la Blache, at the bottom of each page, enhance the value both of the historical and the modern sections of the atlas.

### CURRENT GEOGRAPHICAL PAPERS.

#### NORTH AMERICA.

CANADA.—La Houille Blanche. Les Ressources Hydrauliques de la Province de Québec. E. Rouillard. *Bull. Soc. Géog. Québec*, Jan., 1909.

CANADA.—Les Laurentides. C. Laflamme. *Bull. Soc. Géog. Québec*, Jan., 1909.

CENTRAL AMERICA.—The Panama Canal in 1908. Ill. Map. V. Cornish. *Geog. Jour.*, Feb., 1909.

CUBA.—Conditions in Cuba as Revealed by the Census. H. Gannett. *Nat. Geog. Mag.*, Feb., 1909.

GREAT BASIN.—Erosional Origin of the Great Basin Ranges. C. R. Keyes. *Jour. of Geol.*, No. 1, 1909.

MEXICO.—Bibliografía Geológica y Minera de la República Mexicana. Completada Hasta el Año de 1904. Rafael Aguilar y Santillan. *Bolet. Instituto Geol. México*, No. 17, 1908.

MEXICO.—Dans un District Argentifère du Mexique. A. Bordeaux. *Ills. Tour du Monde*, No. 7, 1909.

UNITED STATES.—The National Forests from an Economic Standpoint. Treadwell Cleveland, Jr. *Bull. Geog. Soc. Phil.*, Jan., 1909.

UNITED STATES.—Reclaiming the Desert. C. J. Blanchard. Ill. *Bull. Geog. Soc. Phil.*, Jan., 1909.

UNITED STATES.—Work of the Department of Agriculture for the West in the Development of New Plant Industries. B. T. Galloway. *Bull. Geog. Soc. Phil.*, Jan., 1909.



UNITED STATES.—Introduction of Domestic Reindeer into Alaska. 16th Ann. Rep. (1906). Sheldon Jackson. Senate, 60th Cong., 1st Sess., Doc. 501, 1908.

UNITED STATES.—Die Bedeutung Alaskas für die Gletscherkunde. G. Partsch. *Gaea*, Jan., 1909.

UNITED STATES.—New Mexico. The Guadalupian Fauna. George H. Girty. 31 Plates, and Index. *Prof. Paper* 58, U. S. Geol. Sur., 1908.

UNITED STATES.—The Geological Occurrence of Rock Salt in Louisiana and East Texas. G. D. Harris. Maps. *Econ. Geol.*, No. 1, 1909.

UNITED STATES.—A Phase of Ground Water Problems in the West. W. C. Mendenhall. *Econ. Geol.*, No. 1, 1909.

UNITED STATES.—The Ancient Kobuk Glacier of Alaska. O. H. Hershey. *Jour. of Geol.*, No. 1, 1909.

WEST INDIES.—St. Pierre and Mt. Pelé in 1908. By E. O. Hovey. Ill. *Amer. Mus. Jour.*, No. 2, 1909.

WESTERN NORTH AMERICA.—Cenozoic Mammal Horizons of Western North America. H. F. Osborn. Faunal Lists of the Tertiary Mammalia of the West. W. D. Matthew. *Bull.* 361, U. S. Geol. Surv., 1909.

#### SOUTH AMERICA.

ARGENTINA.—Die Landwirtschaft in Argentinien mit besonderer Berücksichtigung der Erdnuss- und Reiskultur. L. Friderici. *Tropenpflanzer*, Feb., 1909.

BOLIVIA.—Survey Work on the Frontier between Bolivia and Brazil. Maj. P. H. Fawcett. *Geog. Jour.*, Feb., 1909.

BRAZIL.—La Ceara. P. Denis. *Ann. de Géog.*, Jan., 1909.

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BRAZIL.—Die Zukunft des Parakautschuks am Amazonas. Dr. S. H. Berkhout. *Tropenpflanzer*, Feb., 1909.

#### AFRICA.

ALGERIA.—Les Ports de l'Oranie. Caractères Généraux de la Côte. Ed. Déchaud. *Bull. Trim. Soc. Géog. et d'Archéol. Oran.*, Dec., 1908.

BRITISH BECHUANALAND.—Bericht über eine Reise in Britisch-Betschuana. Dr. Rudolf Pösch. *Mitt. der k. k. Geog. Gesellschaft*, Nos. 9 and 10, 1908.

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SAHARA, FRENCH.—La Question de Mauritanie. G. Demanchhe. *Map. Rev. Franç. de l'Etrang. et des Col.*, Feb., 1909.

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GALILEE.—Wirtschaftliche Verhältnisse in Galiläa. K. L. Miklasiewicz. *Österr. Monatssch. f. d. Orient*, Jan., 1909.

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**L'Aurore Australe. Par Biard D'Aunet. Deuxième Édition.**  
402 pp. Plon-Nourrit et Cie., Paris, 1907.

This thoughtful work, crowned with one of the honours of the French Academy, is a sociological and economic study of Australia. Mr. d'Aunet spent twelve years on that continent, and his aim in writing this book, all but the last two chapters of which had previously appeared in *Revue des Deux Mondes*, was, as he says in the preface, to give an impartial account of Australia's social organization, its institutions and activities. While the work is based upon his own impressions and observations, it is evident that he has consulted a large amount of authoritative material; but he makes few quotations and cites no references and the volume doubtless gains thereby in readable quality.

In the opening lines of his history of the development of Australian society, the author contrasts the pioneer immigrants into North America and Australia, the former being Puritans, driven from home by religious persecution, and the latter, convicts deported from England. He says the Australians are sensitive to any allusion to their "birth stain" and with reason, for the 30,000 convicts deported between 1789 and 1846 left very few descendants, as the number of women was very small during the period of deportation. Most of the present white population are the descendants of the 800,000 immigrants, attracted by the discovery of gold in Victoria, who came into the country between 1851 and 1862.

The first third of the book presents a vivid picture of all the elements that compose the social fabric of the Commonwealth. Another third is given to an illuminating study of Socialism, whose development has been so remarkable in that country. The remaining chapters discuss the Constitution of the Commonwealth and the development and present status of the various economic phases. Only the broader features of geography, such as are most essential to an intelligent

discussion of the country, are mentioned. The book will be classed among the best works that summarize the progress and the present aspects of the Australian people.

**La Perse d'aujourd'hui.** Par Eugène Aubin. viii and 442 pp. and Map. Librairie Armand Colin, Paris, 1908. Pr. 4 frs.

The author began the journey which forms the basis of this narrative in July, 1906, and his travels continued for ten months. From Teheran he made the circuit of Lake Urmia, occupying a period of several weeks. Later he visited Ispahan and went thence to Bagdad, from which he descended the Tigris and returned to Europe by way of the Persian Gulf. The volume is in part a reprint of papers published in *le Temps*, *la Revue des Deux Mondes* and other periodicals.

The early chapters recount the journey from Teheran, describe Tauris and the circumventing of the Lake of Urmia. On the west of this water is the city of Urmia. The story of the city and district is vividly told, the ethnic variety is described as "infinite," with Shiites, Sunnites, Jews, Gregorians and Nestorians, multiplied Christian beliefs and "all the missions imaginable, Catholic, orthodox, Protestants of all sects and all nations." The chief commerce of Urmia is in raisins, of which on the average 22,500,000 kilos are annually exported. This single item is a sample of the abundant information concerning industry and customs which is found in the volume.

After traversing the region of the Kurds southward from the lake, M. Aubin returns to Tauris and thence goes to Artebil and to Astara on the Caspian, at the point where the Russo-Persian border comes down to the sea.

The narrative of travel is here interrupted by chapters on the change of sovereigns, the Persian revolution, the Anglo-Russian accord and Persian customs. The author was so fortunate as to be an eye-witness of recent significant changes in Persia, and this perhaps gives the chief interest to his volume. He saw the new spirit enter the chief cities of the country, first the capital, then Tauris, Ispahan, Kermanshah and Shiraz. The revolution, he thinks, will be much prolonged. It will fall to the Persian liberals to be the educators of their people as well as the reformers of their Government. The present sovereign can favour or retard the movement; but he is described as intelligent and energetic, though his way is beset by Anglo-Russian rivalry, which persists in face of the arrangement between the two Governments. On the resumption of the narrative the chapter heads are the following: From Teheran to Ispahan, Ispahan, Across Irak-Adjemi, the Province of Kertmanshah, the Gates of Zagros, the Holy Cities, and Across Irak-Arabi.

There is a folded relief map of Persia, with the chief towns and routes, and the author's route in red; also two insets, one of Lake Urmia on an enlarged scale, and a small scale map of Persia showing spheres of Russian and English influence in accordance with the convention of August 31, 1907. The book has no alphabetic index, but a syllabus of contents stands at the head of each chapter, and all of these summaries are reprinted together at the end of the volume. A. P. B.

**Les Grandes Antilles. Étude de Géographie économique.** Par Daniel Bellet. xii and 315 pp. and Map. E. Guilmoto, Paris, 1909. Price, 6 frs.

A readable and interesting volume, devoted, as the title indicates, to a general account of Cuba, Porto Rico, Haiti, Santo Domingo, and Jamaica. While the

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object of the author has been to give the larger emphasis to the commercial conditions of the Greater Antilles, due consideration has been paid to the economic and political conditions which have influenced industrial and commercial development. Especial attention has been devoted to the economic rather than to the physical controls of commerce and industry, an emphasis directly the reverse of that usually found in American treatises on commercial geography. The chapters on Cuba and Porto Rico are especially interesting to an American reader, as great credit has been given to the good work of the United States in improving social and hygienic conditions in these islands. It is also satisfying to read a commercial volume which does not bristle with statistics and dry figures, but which presents general truths, substantiated by sufficient details to show that the principles are well founded. While the author, for example, in his discussion of Cuba, devotes the larger attention to sugar and tobacco, he also considers the other products, especially timber, fruits and coffee. Thus the volume proves a good reference volume in spite of its lack of an index and its inadequate map, a poor black and white drawing showing the location of the islands and the railroads, sailing routes and chief cities.

Minor inaccuracies are met with, as when Columbus is said to have discovered America in 1592, and Tampa is given as the capital of Florida. It is amusing to find the people of the United States frequently mentioned as Yankees even in complimentary passages. The volume serves a useful purpose and is a more complete reference book on the Antilles than is readily to be found in English.

R. E. D.

**In Togo's Country. Some Studies in Satsuma, etc.** By Henry B. Schwartz. 233 pp. and Illustrations. Jennings & Graham, Cincinnati, 1908. Price, \$1.50.

An untechnical book for adults, devoted to certain features of Japan. In part it treats of little-known features of the country which the author had unusual opportunities to visit during fourteen years' residence in the Island Kingdom. The descriptions are mainly clear, the illustrations are generally effective, but the volume lacks maps. This is particularly true in the case of the chapters devoted to A Pilgrimage to Zenkoji and to Loo Choo—A Forgotten Kingdom. This latter chapter, devoted to the customs and industries and history of the Loo Choo Islands, and the chapter treating Nagasaki, are in many ways the most interesting in the book. The description of the docks and industrial works of this important city, give a clear idea of the rapidity with which Western ways are being adopted in Japan, and "destroying the quiet, placid Japanese life." The last chapter is a clear summary of the results that have accrued from the late Russo-Japanese war, and of the relative status of Japan, China and Russia. Though the point of view of the author is at times distinctly American in sympathy, he seems to have caught the spirit of the virile and patient nation, and, because of his insight into motives, has added a readable volume to the host of recent books on Japan, a volume which is not scientifically geographic, but frankly descriptive in character.

R. E. D.

**Rocks and Rock Minerals.** By Louis V. Pirsson. 224 pp., Illustrations and Index, John Wiley & Sons, New York, 1903. Price, \$1.25.

This is a simple, beginners' handbook on petrology for the determination of the common rocks without the use of a microscope. While primarily intended

for class use in colleges, it is equally serviceable as a handbook for the working geologist. The volume is divided into three parts. The first considers the methods of study and the chemical character of the earth's crust; the second is devoted to a description and determination of the rock making minerals and the third and larger portion to description and determination of the chief rocks. As is to be expected, more than half of the latter portion is given over to the igneous rocks.

Numerous well-chosen and clearly printed half-tones devoted to rock structure and appearance add much to the value of the work, and an excellent index makes the volume readily usable as a handbook. The general form of presentation shows that the pupil needs a good foundation in general chemistry in order to take up petrology. With such a foundation any beginner could readily proceed far in the study and classification of rocks with such a convenient and inclusive handbook.

The author does not content himself with merely presenting the features of laboratory specimens of the various rocks, but considers their field appearances as well. For instance, under the heading "Occurrence of Igneous Rocks," we find the following subheads which will show the method followed by the author: Intrusive Modes of Occurrence—Dikes, Intrusive Sheets, Laccoliths, Necks, Stocks, Batholiths; Extrusive Igneous Rocks—Quiet Eruption, Lava Flows, Explosive Eruptions, Tuffs and Breccias. A similar method is followed in the other divisions.

The book is satisfying because of its thoroughness, simplicity and practical character and should prove a valuable aid to beginning students in general geology as well as for those who are to devote themselves to aspects of applied geology.

R. E. D.

**Artificial Waterways and Commercial Development.** By A. Barton Hepburn. ix and 115 pp. The Macmillan Company, New York, 1909. Price, \$1.00.

This small volume, which may be easily read at a sitting, emphasizes the importance of waterways as a supplement to the vastly developed railway system of the United States. More directly, it is a brief for an effective waterway across the State of New York, to promote and maintain the commercial supremacy of New York City. The foundation for the argument is broadly laid by an opening chapter on the canals of other lands. The canal system of New York is reviewed, with an account of its beginnings, its progress and its present condition. The familiar story of the inception of the Erie Canal is well told, followed by a notice of cost, traffic, tolls and revenue, with the history of such enlargements as have been undertaken. Emphatic expression is given to the neglect of the past forty years. This neglect has been due to the blindness of the people and to the hostility of the railroads, which have sought to throttle the canals, both to kill competition and to ward off the burden to which, as part owners and taxpayers, they were subject. Political corruption and misappropriation of funds by a powerful canal ring have also played their part. The squandering of \$9,000,000 in the abortive project of 1895 is properly characterized, and a hopeful view is taken of the present undertaking for deepening and enlargement.

A vigorous section exhibits the competition against the City of New York, by which her commerce is transferred to competing ports within and without our own boundaries. The New York Central Railroad is not devoted to the metropolis,

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for it derives equal advantage in freighting to Boston. Differential rates designed to equalize advantages, serve in reality as a handicap to New York. Freight cannot, as at other ports, be delivered on the deck of trans-Atlantic vessels, and thus lighterage charges must be borne, and added to this are inadequate dock facilities. Canadian foresight and liberal expenditure have resulted in strong competition by Dominion ports, and the long planned Georgian Bay route will yet more surely deprive American centres of trade which legitimately belongs to them. These arguments are not new, but they are here presented with convenient brevity and telling simplicity. The same qualities belong to the sections on the Panama Canal and on the relation of navigation to conservation problems. At the end are tabular summaries relating to New York canals, the commerce of New York City, the commerce of the Great Lakes and Canadian canals, and giving data concerning the Panama Canal.

A. P. B.

**The Interpretation of Topographic Maps.** By Rollin D. Salisbury and Wallace W. Atwood. 84 pp., 170 Maps and Half-tone Plates, 34 Figures in the Text and Index. Professional Paper 60, U. S. Geological Survey, Washington, D. C., 1908.

It is a hopeful sign in American Geography that the value of good maps is beginning to be recognized. Professors Salisbury and Atwood have done a work of peculiar value to geographers and to teachers of Geography in the preparation of this paper. The symbolism of the topographic map is fully explained, in connection with the legend, and in the first fifteen plates are assembled illustrations of the chief general kinds of topography, with short but adequate exposition of the method of exhibiting relief. Thus the same area, a small section of coastal lowland along the Potomac River, is shown, (a) with contours only, (b) with drainage only, (c) with contours and drainage combined, (d) with contours, drainage and culture in the complete map. Mountains and plains follow, with varying expression due to different scales and contour intervals employed for the same areas. In some cases a map is placed beside a sketch or photograph of the same or of a similar region. The map of Mt. Shasta, for example, is conjoined with a perspective view of the great cone. In like manner, a morainic area in New Jersey, with its ponds, swamps and dry depressions, is put in comparison with a view of the morainic hills of a neighbouring region. Plate 13 puts together a flat coastal area on Delaware Bay and a rugged shore-line district of California. The next plate shows corresponding shore-line types in photograph, one from Arctic lands and the other from Oregon. The text often interprets the relation of cultural features such as roads and settlements to the forms of the land.

It is known to physiographers that aeolian topography is expressively delineated on many atlas sheets, representing parts of the Atlantic Coast and of the Great Plains. It is not, however, commonly understood that the fleeting winds leave records so capable of graphic representations. The plates of group 2, seven in number, show this type of land form, examples being given from the shores of Chesapeake Bay and of Lake Michigan, and from the plains of Kansas and Nebraska. Any alert instructor would perceive the educational usefulness of the photograph (Pl. 20) of an incipient dune at South Chicago.

Group 3 offers one of the fullest and most important series of maps in the volume, since it represents in wide range the forms due to stream erosion. This part of physiography is widely recognized as of peculiar value in teaching, because illustrations of the type can be found and utilized in the field of all



schools. This series is followed by a closely related group under the head of alluviation. The progressive stages of the erosion cycle are taken as the guide in the selection of examples, and the series properly begins with some fourteen plates whose maps and views exhibit youthful forms. Among these is part of the Highwood Area on the shore of Lake Michigan with a narrow shore belt of incipient dissection: similar stages appear in the lower Genesee and Irondequoit Bay district, near Dunlap on the Illinois River, along the Snake River in Idaho, the Canyons of Arizona, the Yellowstone and the Yosemite, while the initiation of a fresh cycle on flat grounds of glacio-lacustrine deposition is shown for the Iroquois plain in Western New York and on the Fargo quadrangle in Minnesota and North Dakota. Maturity is illustrated from the Appalachian Plateau in West Virginia and Tennessee and among the southern Appalachian ridges of Virginia and West Virginia. The last is supplemented by the corresponding map in geological colours and exhibiting structure sections. Thus the paper has possibilities not only for the layman but for the more serious student who would make careful interpretations in the light of structural geology. Old age is shown from the Princeton quadrangle in Indiana and Illinois, from the Butler area in Missouri and others.

Under alluviation we find the impressive alluvial fans near Cucamonga, Cal., followed in helpful juxtaposition by an effective photograph of a similar feature. Other examples are from the Platte, the Missouri, the Arkansas, the Wisconsin and the Mississippi. We have the deltas of Watkins (N. Y.), of the Puyallup (Tacoma) and the Mississippi, and river terraces of the Connecticut, the Hudson, the Illinois, and the Boise (Idaho).

Sufficient details have now been given to show the method of the authors and to indicate that it is preeminently educational, by illustrating land forms, clearly classified and described in the light of their origin. The descriptions are of necessity brief, conforming to limits of space, but the trained teacher will find abundant means of expanding the instruction and of making a wide range of physical, industrial and historical material gather about the several regions, using these well-chosen maps as the nuclei for study. Those who follow any modern text or laboratory manual will here find matter for comparison and for supplementary work.

Other groups relate to erosion cycles, stream piracy and adjustment, effects of ground water, glaciation, coast lines, volcanism, faults and lakes of special types. Many of the maps include profiles of the regions shown in contour. The group on glaciation is comprehensive and of striking interest. There are moraines from Long Island, New Jersey and Wisconsin; drumlins from Wisconsin and New York; drainage modifications from New York and New Jersey, from the region of the Finger Lakes, the Mohawk Valley, the plateau near Syracuse, the vicinity of Cincinnati, and from the State of Washington, with representations of existing western glaciers, and of the glacial topography due to the action of Cordilleran glaciers which long ago passed away.

A. P. B.

**The Acropolis of Athens.** By **Martin L. D'Ooge.** xx and 405 pp., 134 Illustrations, Map, 3 Appendixes, and Index. The Macmillan Company, New York, 1908. Price, \$4.

An educated person who should hear that a large and handsome book, such as this, had been written about an eminence, 886 feet long, and 512 feet wide, rising some 230 feet above the surrounding country, would be likely to say that of all small phases of nature only the Acropolis had been the scene of so much history,

the repository of such wonderful art and the field of so many years of scholarly research as to call forth such a book. The present work is among the important books and papers on the Acropolis; and it derives additional value from the fact that it is the latest word on the pregnant results of the excavations completed in 1889 and a summing up of the personal studies of the site and the ruins upon it which long occupied the author. Prof. D'Ooge has filled the Greek chair at the University of Michigan for thirty-six years and was Director of the School of Classical Studies at Athens in 1886-7.

The book is designed both for the general reader and for those who wish to make a more minute study of the Acropolis. The interest for most readers is enhanced by the fact that the technical discussions are reserved for the appendixes. A select bibliography is also presented for those who wish to extend their studies. The larger part of the work, however, is for those desiring to peruse the fascinating story of the Acropolis from the ancient days to the present time through all the ages of vicissitude, adornment, decay, and spoliation as revealed in early writings and the fruitful researches of modern archæologists.

This is the task to which Prof. D'Ooge has devoted some of the best years of his life. He writes in the preface that, if the book had not been a labour of love, it never would have been brought to completion in the face of the many difficulties it encountered. But the reader will profit by the author's untiring effort to make clear and consecutive the story of the Acropolis from the earliest historical period. He traces each phase of development or disaster, as far as each is known to us, through the Persian destruction, the rebuilding of the walls and temples, the older Parthenon, the golden age of Pericles with its later Parthenon, the changes wrought in the Roman period and on to the present time. He shows the light that modern investigations and restorations have thrown upon the Acropolis in its crowning glories and in all periods of its history.

Prof. D'Ooge is in hearty sympathy with the "benevolent theft" of Lord Elgin of the so-called Elgin marbles:

Not until 1816 were these marbles bought by the British government at the low price of 35,000 pounds sterling, which is about one-half of the expense incurred in this enterprise. Scrupulously guarded in the halls of the British Museum, the Elgin marbles are at once the best memorial remaining of the glory of Athenian sculpture in its palmiest days, and of the foresight of the Englishmen who saved to the world this precious heritage of the past. For there is every reason to believe that these sculptures, had they remained *in situ*, would have suffered irreparable injury from the vandalism of later tourists and from the bombshells and bullets that were fired at the Acropolis during the war for Greek independence.

The illustrations, many of them full page, admirably supplement the text.

**Handbuch der Klimatologie. Band I. Allgemeine Klimalehre. Dritte Wesentlich Umgearbeitete und Vermehrte Auflage. Von Dr. Julius Hann.** xiv and 394 pp. and 22 Figures. J. Engelhorn, Stuttgart, 1908.

Hann's "Handbuch der Klimatologie" needs no introduction to the scientific world, least of all to geographers. It is fortunate, indeed, for meteorologists that Dr. Hann, in spite of his advancing years, is able to keep abreast of the rising tide of meteorological and climatological literature, for it is certainly out of the question for most of us to attempt the task, to say nothing of accomplishing it. Dr. Hann's remarkable activity and untiring energy in this matter are both discouraging and inspiring—discouraging, because none of us can begin to keep up with him in his grasp of the literature; inspiring, because the activity of such a master-

mind as Hann's must always spur on all workers in the same subject. Within a few years we have had the second edition of the "Handbuch der Klimatologie," the first and second editions of the "Lehrbuch der Meteorologie," and now we have the first volume of the third edition of the "Handbuch," the other parts being promised for an early date. Meteorologists, who are tempted to become discouraged when they stop to think how difficult it is for them to keep up with the times, will breathe a sigh of relief when they open the third edition of the "Handbook" and feel that they are sure of finding mention in it of all important contributions to climatology which have appeared since 1897 (the date of the second edition).

The volume deals with the general aspects of climatology. The remainder of the book will deal with the climates of the different parts of the world. The "Handbuch" appears in the "Bibliothek Geographischer Handbücher," formerly edited by Prof. Friedrich Ratzel and now in the hands of Prof. Albrecht Penck. We are glad to note that the new edition has a somewhat larger size than the former. The increased size of the page will be of special advantage in printing the tables which must form so important a part of the chapters which deal with special climatology. The arrangement of the text has been made more systematic, there being a clearer and more definite series of headings and sub-headings. The former editions always seemed to us to suffer somewhat from the fact that there was not sufficient distinction, in table of contents and in chapter and section headings, between the different parts of the subject.

Those who already know the second edition well, will readily see that there are a great many additions both in text and foot-notes. The discussion of air temperature, instead of coming at the very beginning, is now preceded by several pages on solar radiation and its effects, and on the relation between "climatic temperature" and direct solar radiation. The section of sensible temperatures has been extended, and includes mention of the latest publications on the subject, *e. g.*, Tyler's "hythers." On pages 88-90, under the heading "Neuere Anregungen zu lebendigeren lokalklimatographischen Beschreibungen," mention is made of the emphasis which is being laid on the importance of the cyclonic unit in climatology, and the significant statement is made that "the attention paid to weather types is the striking feature of American climatic discussions." Climatologists in the United States might well agree to make this phase of climatology their especial work. The standard climatic tables for Vienna have been enlarged. Hann's conclusion (page 190) regarding the influence of the forests upon the amount of rainfall is that the effect is a slight one in our latitudes. A new section, entitled "Die grossen Klimagürtel der Erde" (pp. 321-344), takes up the division of the earth's surface into the larger climatic belts or zones. The sixth "book," on changes and oscillations of climate, is more clearly and logically arranged than before. A good deal of new matter has been added. The distinction between historical and geological changes; between instrumental and non-instrumental observations, and between progressive and oscillatory changes, is made clear. Of the recent work of Stein, Huntington and others, in Asia, Hann says that "we can hardly any longer doubt that we have in these districts a general desiccation, which is still in progress," but goes on to say "How far in all these accounts we have to do with a progressive desiccation, and how far with climatic oscillations, is still a question." A few new illustrations have been added. Of these, perhaps the most interesting are those which show the forest limits, the limits of human settlements, and the snow-line, in Switzerland (page 278).

Dr. Hann deserves, and will surely receive, the hearty thanks of all his fellow-workers in meteorology the world over, as well as of men of science generally, for giving them this invaluable new edition of a book which was already indispensable, and which, in its present still more complete form, becomes more indispensable than ever.

R. DEC. W.

**Ice-bound Heights of the Mustagh.** By Fanny B. and W. H. Workman. xvi and 444 pp., Maps and Illustrations. Charles Scribner's Sons, New York, 1908.

We have in this attractive volume the narrative of explorations during the summers of 1902 and 1903 among the glaciers and the high peaks of the Karakoram or Mustagh Range. The authors follow custom and use the term Himalayan after indicating that, strictly, the Mustagh lies to the northward of the western Himalayas. The approach was made in the spring of 1902 by the Vale of Kashmir and Srinagar and thence to Arandu which lies at the foot of the Chogo Lungma glacier. This ice stream, with its branches on surrounding peaks and cols, formed the goal of the exploration. The trunk glacier extends thirty miles from Arandu in a west-northwest direction. The upper half of this glacier and over fifty miles of large branches offered a virgin field to the explorers. The district lies a little to the north of the Biafo glacier which Dr. and Mrs. Workman explored in 1899.

The front of Chogo Lungma glacier at Arandu stands at an altitude of 9,500 feet, while its head marks 19,000 feet at the base of a snow col which rises to 20,000 feet. The lower nine miles of the stream are nearly concealed by jagged masses of morainic *débris*. From observation by Col. Godwin Austin in 1862 it is known that this section of the glacier has shrunk considerably in the intervening forty years. Successive lateral moraines mark the recession from the valley walls by amounts varying from 50 to 600 feet. Six parallel morainic ridges were counted at one point. The Bolucho glacier must formerly have been confluent with the trunk stream, from which its front has now receded, leaving a gap of a half mile. The middle section of the main glacier shows six well-marked medial moraines and some of these are composite. The upper section, nine miles long, marks a rise of 5,000 feet, offering first a series of séracs and ice-falls, with névé and snow on the slopes approaching the head of the glacier. There are fourteen lateral streams, of which those entering from the north seem to be waning like the Bolucho, while the southern branches show no such tendency. The Haramosh, one of the greatest of these tributaries from the south, 11½ miles long, contributes an active component of the Chogo Lungma, pressing powerfully into it at the point of junction. Crevasse glacier is of about equal length and joins the trunk glacier within four or five miles of its head. The rate of movement of Chogo Lungma was determined at two points about the middle of its course. The amount varied from about one and one-half feet per day nearer the edge of the stream, to about three feet half way across the glacier.

The most noteworthy ascents were those of Mount Chogo, 21,500 feet, and Mount Lungma 22,568 feet, and Dr. Workman's attempt upon Pyramid Peak, 24,500 feet, in which he attained 23,394 feet. These summits are close together, north of the great glacier near its head. Mount Lungma was ascended by Mrs. Workman, who thus broke her previous altitude record for women, of 21,000 feet. She has since made 23,300 feet in the Nun Kun Range, which, as is stated, places her with the small band of men who have reached a height of over 23,000 feet.

The season of 1903 took the explorers up the Hoh Lumba and Sasbon glaciers, two important ice streams lying closely parallel to each other, and heading northward on cols not far from the col that separates the Biafo and the Hispar glaciers. They later returned to Arandu and to the Chogo Lungma to complete the work of the previous season. They then went up the Bolucho and over a perilous col, with their entire caravan of coolies, down the Kero Lungma glacier, and up the Alchori to the col overlooking the Hispar glacier. They had hoped to retrace the Kero Lungma and go down the Hispar to Gilghit, but were prevented by the fears of the coolies.

The entire course for the two seasons is plotted on an excellent folding map on a scale of 1:150,000, showing well the general topography as well as the moraines and other features of the glacial system.

The story is vivaciously told and narrates with becoming modesty feats of the most difficult mountaineering. There are now and then passages of brilliant description of scenes of surpassing grandeur witnessed from points of great altitude. Pardonably, it would seem, years of conquest in the Himalaya make the Alps appear to the authors somewhat diminutive. They appreciate the freedom from man and the commonplace which mars too often the mountains of Europe.

The would-be explorer in high altitudes will find much of useful experience and suggestion, particularly in the closing chapters, which discuss the management of coolies and the determination of altitudes by aneroids and other instruments. Interesting experiences are given concerning the physiological effects of high altitudes, more especially as attempts upon high peaks and cols required repeated pitching of camp at altitudes of from 15,000 to more than 19,000 feet. Many interesting records of high sun temperatures at great altitudes are given, 100° F. being often approximated and sometimes exceeded, while the shade temperature of noon would be 55° and the night temperature 20° or even near 0°. The physiographer finds an interesting note (p. 274) on rapid weathering at high altitudes and would have welcomed fuller information on the glacial modifications of topography, and on possible former extensions of the glaciers in the valleys.

These hardy explorers have given us a story of serious adventure which on no page allows the reader to relax his interest; and the wealth of splendid views, of which some are in colour, give at least some hint of the joy of adventure and supreme toil among the wildest scenes of nature.

A. P. B.

**La Basse-Normandie. Étude de Géographie Régionale. Par Raoul de Félice.** pp. 596, Map and Illustrations. Hachette & Co., Paris, 1907.

One of the thorough and admirable studies of regions in France, a number of which have appeared in recent years. In arrangement and treatment, it is a model worth the study of all writers on regional geography. The author includes in Low Normandy the calcareous "Campagnes" of Caen and Alençon, the argillaceous lands of Bessin and the ancient terrains of Cotentin and Bocage. The large volume is given to this comparatively small area. Its physical geography, dealing with geological evolution, climate, hydrography, and the general aspects and divisions of Low Normandy, is treated in Part 1 occupying 216 pp. Part 2 (331 pages) is devoted to anthropo-geography, the races and their moral and intellectual condition, peasant life, stock raising and agriculture, the extractive and manufacturing industries, ports and other commercial facilities, etc. The bibli-

ography, with explanatory text, fills 16 pages, and geological and meteorological tables are given in the appendixes. The illustrative material includes a large-scale geological map in colours and many black sketch maps and diagrams.

**Pekin to Paris. An Account of Prince Borghese's Journey Across Two Continents in a Motor Car. By Luigi Barzini.**

Introduction by Prince Borghese. 645 pp., Map, and 100 Illustrations. Mitchell Kennerley, New York, 1908. Price, \$5.00.

Prince Borghese, known to fame as a motorist and traveller, and Mr. Barzini, an Italian journalist, were chosen in 1907 to attempt the feat proposed by the *Paris Matin* of travelling from Peking to Paris by motor car. Accompanied by the Prince's chauffeur, Ettore Guizzardi, they had a most eventful experience in crossing the mountains, deserts, and steppes, the rivers, woodlands, and quagmires of Asia and eastern Europe. Somehow or other the machine and its occupants survived, and two months after leaving Peking the three weary travellers, in their battered car, pulled up at the *Matin* office in Paris.

In his introduction, Prince Borghese remarks that "there are people who say that our journey has proved one thing above all others, namely, that it is impossible to go by motor car from Peking to Paris!" He goes on to say:

After all, the paradox is a literally accurate statement of fact, and this is exactly what our journey has proved: that in the present year of grace it is impossible to go by motor car alone—comfortably seated on the cushions of the same—from Peking to Paris.

In writing this, the Prince had in mind the numerous breakdowns; helpless flounderings in bogs; the car reposing on the bottom of rivers with natives enlisted from far and wide to fish it out; the impressive array of animals pulling the vehicle up steep mountain slopes; the hundreds of involuntary halts that punctuated the journey from beginning to end. It was not a pleasure excursion, and the machine was induced to hang together only by the most skillful and persistent tinkering.

Mr. Barzini tells the story of the exploit with much vivacity. There is no end of incident and variety and text and pictures do them justice. The book is an entertaining account of a novel undertaking that is not likely soon to be repeated.

**Die deutschen Südsee-Inseln. Von Pastor C. Paul.** 260 pp., and Map. C. Ludwig Ungelenk, Dresden, 1908. Price, 2.50 M.

This book is Part 4 of the series "Die Mission in unsern Kolonien." It gives a clear description of the development and condition of the Christian missions in Kaiser Wilhelm Land, the Bismarck Archipelago, the Carolines, Marshall Islands, and Samoa. The work is a good example of the kind of missionary literature that has some anthropo-geographical quality. It treats of the experience of missionaries among primitive peoples, some of whom had scarcely been affected by white influences. The inhabitants are characterized as they were found, and the progress, great or small, that marked the labours of the foreign teachers is indicated.

**Corsica. An Island of Rest. By John Mitchel Chapman.** viii and 380 pp., Map, Illustrations, and Index. Edward Stanford, London, 1908. Price, 7s. 6d.

In the course of many visits, the author has seen every corner of Corsica, and, like most visitors, he is in love with the island and its inhabitants. This charming

volume is not at all like a guide book, for, as we read it, Mr. Chapman seems simply to be taking a party of friends along the roads and paths, leading them to points of vantage where the finest scenic panoramas are unfolded, relating anecdotes or bits of history that stimulate interest in what is seen and acquainting his auditors with the people, in much more than their superficial aspects, for, in fact, he has made a psychological study of them. Corsica lies apart from the beaten tourist routes, but this sincere and unpretentious volume is well calculated to stimulate interest in one of the most beautiful islands in the world.

**Dakar. Ses Origines-Son Avenir. Par Georges Ribot et Robert Lafon.** 198 pp., many Illustrations from Photographs and Maps, and Plans in Colours. G. Delmas, Bordeaux, 1908. Price, 6 frs.

Dakar, one of the best harbours on the coast of West Africa, has, since 1902, been the capital of Senegal, supplanting, politically, the much larger town of St. Louis, to the north. It long had the reputation of being one of the most unhealthy spots in Africa. A wonderful transformation, however, has been made in recent years, and this handsome volume was written to show that the evil reputation so long borne by Dakar, is no longer deserved.

The town, in fact, has been reclaimed and its health conditions are now favourable. The work has been costly, but the expense has been cheerfully borne. Among the many improvements that have brought the change about are the introduction of a sewerage system, the widening of the streets, the filling up of insalubrious ravines, the removal of slaughter yards from the town, the collection and burning of offal, regulations requiring sanitation in buildings, etc. The good work that has been done and the great progress of the city in the construction of parks, commodious buildings and wide streets are well described in text and picture. It is not unlikely that this book will give ideas and inspiration for sanitary improvement in many other tropical towns.

**The Discovery and Settlement of Port Mackay, Queensland. By H. Ling Roth.** viii and 114 pp., many Illustrations, Charts and Maps, Index, and Notes on the Natural History of the District. F. King & Sons, Ltd., Halifax, England, 1908. Price, 10s. 6d.

The author is well known for his contributions to economic geography and ethnographical literature. The district of Port Mackay is now the chief seat of the sugar industry in Queensland, and it is a curious fact that the site of the present port and the surrounding country were never seen by a white man till they were discovered by Captain John Mackay in 1860, though the regions to the south, west and north of them had already become more or less settled. The planters there are noted for their enterprise, and on one occasion, when the government refused to grant them certain reforms which they demanded, they elected the British statesman, John Bright, to represent them in the Legislative Assembly. He declined the honour extended to him from half around the world.

Mr. Roth has recorded an important bit of geographical history, the material for which has never before been collated. He publishes Captain Mackay's too concise diary of his eventful pioneer journey; and the notes he has been collecting, for years, have helped him to write a history of the discovery of Port Mackay, of the early settlement, the present city and the country tributary to it, that is practically complete. The book will be welcomed as a worthy contribution to our knowledge of the beginnings and progress of an important part of Queensland.



**Der Panamakanal. Von Dr. Fritz Regel.** 128 pp., 6 Pictures, 4 Maps, a Profile of the Canal and Bibliography. Gebauer Schwetschke Druckerei und Verlag, Halle a. S., 1909. Price, 4 M.

This small work is intended to give the German nation a clear idea of the history of the Isthmian canal projects and of the relation of the United States to the present enterprise and the work it is doing. The historical section closes with 1907. The geographical conditions of the canal zone and of the cities of Colon and Panama are then discussed, 10 pages are given to the meaning of the Panama Canal and the influence it will exert upon the world's trade, and the book concludes with an almost exhaustive list of the literature on the subject. It is packed with facts that are well arranged and clearly expressed. The author is Professor of Geography at the University of Würzburg.

**Die Heldentaten des Dom Christoph da Gama in Abessinien. Nach dem portugiesischen Berichte des Miguel de Castanhoso. Uebersetzt und herausgegeben von Enno Littmann.** xxiii and 132 pp., and Map. Karl Curtius, Berlin, 1907. Price (paper), 3.20 M.

Christoph da Gama was one of the sons of the famous Vasco da Gama. His gallant though ill-fated campaign in Abyssinia, in the middle of the 16th century, for the relief of the native Christians, oppressed by the Mohammedans, has an honoured place in the annals of Portugal. Castanhoso's detailed report on this remarkable expedition of a handful of Portuguese soldiers into the depths of an unknown land has been translated into several languages and the English edition was issued by the Hakluyt Society. The German edition, now translated from the Portuguese and edited by Prof. Littmann, of Strassburg University, will rank among the most scholarly works on this historical chapter. The German edition is enriched by 42 pages of notes written by Prof. Littmann.

**Wie es im Congo Staat Zugeht. Skizzen von Erwin Federspiel.** 84 pp. Art. Institut Orell Füssli, Zürich, 1909. Price, 80 pf.

The author was formerly Commissioner of the Stanley Falls District. He gives some space to good-tempered criticism and refutation of the view, so widely spread, that the conduct of Congo affairs has violated humanity and civilization. He discusses this question especially in relation to taxation of the natives, the conduct of military expeditions and the rubber industry. He says that in all his wide travels he never saw a case of the mutilation of a native in which any agent or servant of the Congo Free State was concerned. The second part of the book is given to sketches of life in the Congo with particular reference to the natives. The little volume is a worthy addition to Congo literature.

**Landeskunde des Europäischen Russlands nebst Finnlands. Von Prof. Dr. A. Philippson.** 148 pp., 9 photographic Illustrations, 7 Maps in the Text, 1 hypsometrical Map in Colours, and Index. G. J. Göschen'sche Verlagshandlung, Leipzig, 1908. Price, 80 pf.

A condensed geographical study by the well-known Professor of Geography in the University of Halle on S. The work is based, in part, upon Dr. Philippson's own field studies. It is a good example of the application of the most approved methods of geographical science in a description of the natural features, cultural conditions, and the racial and political development of the Russian plain and bordering regions.

**Palästina. Von D. Hermann Guthe.** 167 pp., 142 Photographs, Map in colours, and Index. Velhagen & Klasing, Leipzig, 1909. Price, 4 M.

This is No. 21 of the excellent "Land und Leute" series, all uncommonly well illustrated and written for the general reader by well-known geographers. The geographic specialty of the author of this volume, Prof. Guthe, of the University of Leipzig, is Palestine. The reader may be assured of the reliability of the text and at the same time, a very large amount of information is presented in a manner calculated to interest all intelligent persons. The region treated extends from Damascus to the Dead Sea and includes the historic area east of the Jordan. This is a unique contribution to the literature of Palestine because it is both cheap in price and admirable in text and illustration.

**La Mer. Populations Maritimes. Migrations—Pêches—Commerce—Domination de la Mer. Par Camille Vallaux.** 377 pp., Technical Vocabulary, Bibliography, and Index. Octave Doin, Paris, 1908. Price, 6 fr.

Not a treatise on oceanography, but a study of the ocean in relation to human life and enterprise. The book is permeated with the ideas and influences of Ratzel, of which full acknowledgment is made. The topics include concise discussions of types of coasts, islands and insularity, deep sea and coastal fisheries described and contrasted, trans-oceanic migrations, sea routes compared with lands routes, maritime commerce in polar and equatorial regions, etc. There is a social science of the sea and the author shows its geographical relations. The long bibliography contains some mistakes in the alphabetical arrangement of the names of American authors, *e. g.*, "Morris Davis, W.," and "Russell, Smith, J." The book is brimful of suggestive information and deductions therefrom. Its author is professor of geography at the French Naval School.

**Out of Door Studies in Geography: I—The Making of the Surface and Soils of the Upper Mississippi Region. By F. M. Fultz.** 111 pp. and many Illustrations from Photographs. The Public School Publishing Co., Bloomington, Ill., 1908. Price, 60 c.

A reading book for children which may be used with the greatest profit in the central Western States. It includes chapters on Glaciers, Ice and Water Erosion, The Upper Mississippi Region, The Mississippi River from St. Louis to Minneapolis, An Iowa Coal Mine, and Granite Works and Stone Cutters' Shops. Each topic is simply and clearly presented and illustrated by a series of well-chosen and effective half-tones. The book will serve as excellent supplementary reading in the intermediate grades, but is not sufficiently inclusive to be the only book used in this way in any grade.

R. E. D.

**Views of the Mission Mountains, Flathead Lake and Valley. By Morton J. Elrod, Missoula, Mont.** The Albertype Co., Brooklyn, N. Y. Price, \$1.00.

A panorama of the Mission Mountains and twenty other large photographic reproductions of scenes in the Flathead Indian Reservation, Montana, which has recently been thrown open to settlement. Mr. Elrod, of the Department of Biology in the State University of Montana, at Missoula, selected these superb views, the pick of several hundred negatives, and has supplied a page of introductory text.

The pictures give a vivid idea of the various geographical phases of this region where some of the finest scenery of America is to be found. We see the snow-clad peaks, the fertile valleys, the cascades, foaming rapids and placid lakes, the grazing and farm lands and the stately forests of this favoured area, about 2,500 square miles in extent. The booklet is very timely, for it shows the natural conditions of the region on the eve of occupation by thousands of settlers who will bring about great changes, though they can never ruin the scenery. More than half of Flathead Lake, covering over 300 square miles, is in the Reservation, and is destined to be one of the great pleasure resorts of our northwest. Mr. Elrod was so fortunate as to catch, on one of his superb negatives, a distant view of all that is left of the largest herd of undomesticated buffalo that recently roamed the plains, about 200 yet remaining.

**Die Deutsche Kolonialgesellschaft, 1882-1907.** Im Auftrage des Ausschusses der Deutschen Kolonialgesellschaft dargestellt. v and 229 pp. and Index. D. Reimer (Ernst Vohsen), Berlin, 1908. Price, 2 M.

A summary of the first 25 years of activity of the German Colonial Society. Next to the United States, Germany is the youngest of the colonial powers. No influence, outside of the German government, has so effectively promoted the colonial movement as this society. Its membership, for years, has been nearly 40,000 and it has had large means with which to promote, in many ways, enterprises that would be helpful to the colonies. To mention just a few features of the work in which the co-operation of the society has been enlisted, we may speak of scientific surveys and map-making, agricultural experiment stations, studies in tropical hygiene, German emigration to German Southwest Africa, investigation of the water problem in that colony, promotion of the construction of hospitals, the establishment of schools, training of African elephants as draught animals, the maintenance in Berlin of a permanent colonial exhibition, etc. The book is chiefly a record of the ways in which the society has endeavoured to promote the development of the colonies and, in some senses, it is practically a history of the progress of the German colonial movement.

**Spain and Portugal. Handbook for Travellers. By Karl Baedeker.** Third Edition. xcvi and 588 pp., 9 Maps, 57 Plans, Index and List of Artists. Karl Baedeker, Leipzig, 1908. Price, 16 M.

The introductory article on Spanish art, written by Professor C. Justi of Bonn, will help the traveller to appreciate the paintings, statues, and architectural monuments he sees. As the book is intended for English-speaking persons, heights are given in the text in English feet. The appearance of this edition, carefully brought up to date, will be appreciated, as changes are constantly taking place in Spain, especially now that the Spaniards are evincing greater desire to attract tourists by offering them more conveniences for travel and sightseeing.

**Norway at Home. By Thomas B. Wilson.** xi and 228 pp., 12 Illustrations and Index. George Newnes, Ltd., London, 1909 (?). Price, 5s.

A study of the life and occupations of the Norwegians by an author who has written other standard works on Norway and has had an intimate acquaintance with the country for thirty-four years. He first gives an excellent, condensed

description of the geographical features of the Kingdom and shows the effects of topography and climate in distributing Norway's communications and industries. The next chapter deals with the constitution and government under which the people now live, with practically universal suffrage. Among the other leading topics are the national defense, religion, literature, and music, education, social life, agriculture, rural customs, forestry, local government, poor laws, industrial life, travel by road, rail and steamer, the fisheries, and Norway as a playground. Its advantages in the latter respect are attracting an increasing number of tourists every year. The book is written *con amore*, is based upon expert knowledge of the country and its people, and we have seen few books on Norway that impart so clear an idea of the genius of the native character and of the natural influences that have helped to shape the lives and activities of the Norwegians.

**Six Mois chez les Touareg du Ahaggar.** Par Maurice Benhazera. xxiii and 233 pp., Photographic Illustrations, Maps, Appendixes, Tracings of Inscriptions, and Index. Adolphe Jourdan, Algiers, 1908.

It was said only three years ago that no photographs had yet been made of the Tuaregs. This book has a considerable number of photographs of the people, though their faces are veiled according to their custom. There are many other photographs showing the Tuaregs with their flocks and camels and a large number of half-tones presenting many vivid aspects of their home land among the Ahaggar mountains.

Mr. Benhazera's work was preceded by reports on different sections of the Tuaregs written by officers in the French service under disadvantageous circumstances, for they could employ, in research, only a little time snatched from the onerous routine of regular duty. The present author, however, especially equipped for ethnographical investigation, was sent among the Tuaregs to devote all his time to the study of them. With the excellent facilities at his command, he has been able to write by far the best account that has yet appeared of these nomads, who, until recently, were the terror of desert caravans. The results of his short period of work cannot be regarded as exhaustive, for, doubtless, many points relating to the history and customs of the Tuaregs escaped his attention. The day has not yet come for a complete discussion of this remarkable people. But Mr. Benhazera's book is scientific in quality and throws much light upon the language, inscriptions, customs, industries, and history of this people.

**Through the Mackenzie Basin. A Narrative of the Athabasca and Peace River Treaty Expedition of 1899.** By Charles Mair. Also, **Notes on the Mammals and Birds of Northern Canada**, by Roderick MacFarlane. 490 pp., Map, Illustrations, Appendix, and Index of Mammals and Birds. Simpkin, Marshall, Hamilton, Kent & Co., London, 1908. Price, 8s.

Mr. Mair accompanied the Canadian Commission which, in 1899, made treaties with the Indian bands in the basins of the Athabasca and Peace rivers. He writes of the work of the Commission, but gives the larger part of the book to describing the regions through which they passed. Details of the development already achieved in Athabasca by pioneer white settlers are very interesting and seem to justify the author's confidence in the future of this vast region. He says, in fact, that the future of Athabasca is more certain to-day than the future of Manitoba

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seemed to be to the doubters of thirty years ago. The area of fertile land is enormous, the bracing climate will stimulate industry and the settlement of the region is certain. It will take time, however, for a large population to create homes in this wilderness, as vast forests must be cleared, and not until railroads are built will immigration on a large scale be practicable.

The book contains many photographs illustrating phases of the northern land and its people. Mr. MacFarlane's Notes on the Mammals and Birds are the result of his long residence in northern Canada in the service of the Hudson Bay Company. His lists and descriptions are of much interest and value. The testimony of this volume is confirmatory of other recent reports that there is still room for hundreds of thousands of white pioneers in regions north of the present limit of farm development in the plains area of western Canada.

**Ruvenzori. By Filippo de Filippi.** xvi and 404 pp., 150 Illustrations in the Text, 32 Plates and 5 Maps. A. Constable & Co., London, 1908.

In exploring the culminating mountain range of Africa, the Duke of the Abruzzi has added a new triumph to his remarkable record of achievement. The present narrative is prepared from the notes of the exploring party by Filippo de Filippi, F.R.G.S., who was not a member of the expedition, but who had previously accompanied the Duke in similar work. An introductory chapter sketches the work of previous explorers, Stanley, Stairs, Stuhlmann, Scott-Elliot and others, and appendixes give reports on astronomic, geodetic and meteorological observations. A summary of the geology is added, with a zoological and botanical list. Detailed reports on these latter subjects are to constitute a second volume to be published in Italian.

The narrative begins with the journey from Naples to Mombasa, and thence by rail, steamboat, and caravan to Fort Portal at the eastern base of the range. Rain and mist form the chief difficulty of exploration, and account for the uncertainties of tradition and for the vague and conflicting reports of later exploration. Surrounded by the marshes of Uganda and the moist and torrid forests of the Congo, this short but lofty range becomes a nucleus for the condensation of vapours and for frequent and tumultuous storms about the cold peaks. There was no clear choice of seasons, but it was planned to reach the mountains early in June, 1906. The objects were primarily geographic, with such related investigations as have already been suggested. Of eighteen notable peaks named, seventeen were ascended, some repeatedly, and of these the head of the expedition went to the summit of thirteen. The work was carried out with a degree of thoroughness which leaves little to be desired, and the maps are based on surveys executed with remarkable persistence and care.

The party proceeded up the Mobuku Valley to Bujongolo, where, under a cliff, on difficult ground, the base camp was established, which was occupied, according to need, for five weeks. On the way a new and important tributary valley was discovered, the Bujuku, leading from the heart of the range, southeastward to a junction with the Mobuku. Around this new valley the major peaks group themselves somewhat in the form of the capital letter G.

Contrary to the usual conditions of a dominating continental range, the Ruvenzori rises, not from high central plateaux, but from the "Albertine Depression," a region lying several hundred feet below the average surface of Uganda. The waters descending in every direction, gather to one outflow, including in the hydrographical system, Lake Albert Edward, the Semliki River and Lake Albert.

The continental divide is not on these lofty crests, therefore, but, following low hills in the Congo forest a little to the west, separates the Congo from these southwestern sources of the Nile.

The name Ruwenzori was given by Stanley and is preserved by the Duke of the Abruzzi. The term is translated, "King of the Clouds," or "Rain-maker," and its appropriateness receives emphasis from the experiences of almost every day which the party spent in the range. The most westerly eminence is Mt. Stanley, which contains the highest peaks, named by the Duke, Margherita (16,815 feet), Alexandra (16,749 feet), Elena (16,338 feet) and Savoia (16,339 feet). To the southeast is Mt. Baker, with Edward Peak (15,988 feet) and Semper Peak (15,843 feet). To the northeast is Mt. Speke, whose highest point is Vittorio Emanuele (16,080 feet). Among other heights are Mt. Emin, Mt. Gessi, and Mt. Luigi di Savoia, the last name assigned upon the insistence of the Royal Geographical Society. Various peaks and passes fix in the range the names of Sella, Stain, Freshfield, Cagni, Wallaston, Moore, Scott-Elliot, Stuhlmann, Johnston and others. Of the five passes separating the six principal mountain groups, four exceed an altitude of 14,000 feet.

The summits of all of the six groups are largely mantled with small glaciers, which are all receding. Their frontal moraines are small, and the water flowing from them is often limpid, showing thus little activity and small erosive action. Great snow cornices are common, and beneath them hang stalactites of ice in such strength and abundance as to serve as a support. These peculiar features are due to incessant freezing and thawing in this equatorial situation. For the same reason the snows pass directly into glacial ice, apparently without an intermediate névé stage. The snow limit is placed between 14,700 and 14,800 feet and the glaciers do not now descend much below this level. Many evidences of former extension of the glacial ice are given. Unquestionable proofs carry the former glaciation at one point down to 4,500 feet. The western slope was not traversed sufficiently to reveal the lower limit of glaciation on that side.

The range itself is believed to consist of rocks of pre-Paleozoic age, and is described by Professor Roccati as due to an anticlinal or ellipsoid upheaval between the two great zones of fracture on the east and west. Two further items of interest relate to the meteorology. Striking evidences of electrical action are found on some of the peaks and on one occasion the Duke and his party were exposed to a dangerous electrical storm. Below the snow line and the glaciers and down to 9,000 feet there is a boggy layer of "peat-turf," often 20 inches or more in thickness, which sustains a rank vegetation and almost completely protects the slopes of that zone from erosion.

The contrast between mountain and plain is well expressed in the joy of all, at leaving behind mud and stones, "melancholy vegetation," the "pallid light of the mists" and the "everlasting drip of the rains" to go down to the sun and heat of tropical plains. Abruzzi believes with Stanley that the Ruwenzori is identical with the Mountains of the Moon of Ptolemy, and he brought to the Royal Geographical Society a few months later the results of those full discoveries for which Stanley had, five years before, in the same presence, expressed an ardent hope.

A. P. B.

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